REPORT

OF A

TOPOGRAPHICAL AND GEOLOGICAL EXPLORATION

OF THE

WESTERN DISTRICTS OF THE NELSON PROVINCE,

NEW ZEALAND.

UNDERTAKEN FOR THE PROVINCIAL GOVERNMENT BY

JULIUS HAAST, Esq.

Published by Authority.

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Provincial Secretary's Office, Nelson,
January 1, 1861.

The following Report, with the explanatory letter of Mr. Haast, is published by order of his Honour the Superintendent.

ALFRED DOMETT,
Provincial Secretary.

EXPLANATORY LETTER.

Nelson, November 27, 1860.

Sir—I have the honour to enclose to you the Report of my recent Exploration of the West Coast District of this Province, undertaken at the request of the Provincial Government.

I also enclose Topographical and Geological Maps, illustrative of my Report, which I have deemed most convenient to divide into six parts.

The first comprises a Descriptive Narrative of my Journey, the second contains the Physical Geography of that part of the Province which I visited, and the third treats of the Geology of the country.

In the fourth part, under the head Passes, Roads, and Available Lands, I have endeavoured to give as full and detailed a description as I thought would be useful to facilitate the opening for settlement of this important district.

I have devoted the fifth and sixth parts to such general observations on Zoology and Botany as the difficulties under which I laboured during my journey permitted me to make.

In forwarding to you this Report, may I be permitted to express my earnest hope, that the results obtained during my exploration will ultimately be such as to advance the best interests of this Province.

I have the honour to be,

Sir,

Your obedient servant,

JULIUS HAAST.

To his Honour the Superintendent,

Nelson.

EXPLORATION OF THE WESTERN DISTRICTS OF THE PROVINCE OF NELSON.

CHAPTER I.

DESCRIPTIVE NARRATIVE OF JOURNEY.

On Monday, the 8th of January last, I started from Nelson, accompanied by Mr. James Burnett, a surveyor, who, at my request, had been engaged by the Provincial Government as my topographical assistant.

It was one of those bright sunny days which give so much charm to the climate of Nelson. As we passed through the Waimea plain, we observed with pleasure the numerous farms and homesteads with which it is dotted; their green fields and enclosed meadows enlivened by the presence of stately cattle. Cultivations became more sparse as we proceeded, the original waste having here and there only as yet given way before the industry of the hard-working settler, whose humble abode, in many instances, appeared to have risen from a forest of charred stumps.

From Fox-hill (where we passed our first night) we followed, for some distance, the course of the River Wai-iti, having on our left the rocky walls of Ben Nevis. At the end of a valley branching off to the right of the river, we ascended a saddle about 400 feet high, which forms the watershed between the Waimea districts and the Motueka valley. It was here that I established my first station, from which our view penetrated deep into the recesses of the high and rugged mountain-chain south of the Wangapeka, whose snowy summits were then glittering in the beams of the setting sun. It was dark when we arrived in the Motueka valley, where we received (at the house of Mr. Hooker) a hearty welcome.

Here we bade adieu for some time to come to the comforts of a civilized life, and prepared ourselves for our sojourn in the wilderness. Although it rained heavily the next morning, we nevertheless started for the Lake-house, an abandoned shepherd's station. We crossed the Motueka river, and followed the old

Wairau road, which leads towards the south-west, up one of the numerous little valleys here branching off from the main valley. The road then passes over a ridge, from 500 to 600 feet high, into the valley of the Motupiko.

Crossing this river also, we ascended a spur on its opposite side. Here our road diverged from that leading through the Big Bush into the Wairau, ours trending more to the westward. After having passed over several hills densely covered with fern, we arrived at the Rainy river, a tributary of the Motueka. As if to justify its name, the rain began to fall more heavily than in the morning, whilst we proceeded to ascend the wooded range on its western side (rising to the height of 2,350 feet), which forms the watershed between Blind Bay and the West Coast. We therefore pushed across this range as fast as we could, for the purpose of obtaining shelter. We found it very steep; and it was not until late in the evening that we reached the old station-house, which is situated in a small grassy valley, the water flowing through which falls into the Roto-iti river, above the Devil's Grip. We rested for the night in the old house, which we found going rapidly to decay, and started the next morning towards Lake Roto-iti.

Ascending a low saddle which separates the Lake-house station from the Roto-iti valley, I obtained an extensive view of the country. In the foreground, close below us, lay the large valley of the Roto-iti, which we could see up to the point at which the river flows out of the lake, and which contains several regular terraces covered with grass. To the east and south-east rose high rocky mountains, bounding the Wairau valley, and running to a common centre in Mount Franklin, which towered above them all, its huge sides clad with eternal snow. On the west lay the rugged chains between the Wangapeka and the Buller, sloping down to the Devil's Grip. On the southern side of the Devil's Grip appeared rounded summits, clothed with wood, over which again rose high sharp peaks, giving to the whole landscape a variety to which the pencil of the artist alone can do justice.

Our road led us along the banks of the meandering Roto-iti to the lake, where, after a walk of twelve miles, we pitched our tents on its north-western bank, at the foot of a low wooded hill. It was with the greatest delight that I looked over this beautiful lake; its deep blue waters reflected the high rocky mountain chains on its eastern and southern shores, which, for a considerable height from the water's edge (from which they rise abruptly), are clad with luxuriant primeval forest. The surface of the lake swarmed with birds, giving life to this magnificent scene. Its peaceful aspect was, however, soon changed, for a heavy storm came up from the westward; and the thunder, re-echoing a hundred times from the mountain ravines, filled us with admiring awe. Towards evening the weather cleared, a magnificent rain-

bow threw its arch across the lake, and the setting sun gilded with deep hues the snow which streaked the serrated peaks of the surrounding mountain chains.

Next morning we began our work by measuring a base line on the shores of the lake, following all its curves. On the western side this was easy, because the country was open and nearly level, but on the northern side we experienced considerable difficulty, for here the country consists of small hills, clothed with luxuriant vegetation, which completely overhangs the banks of the lake, compelling us to wade through the water, and to climb over the rocks which lie everywhere on its margin. The lake is almost divided into two large basins by a low promontory on its northern side. Beyond this promontory the inner lake stretches far to the south, between two mountain chains, which contain the sources of its principal feeders, whilst its more northerly portion is surrounded by low land, presenting a totally different appearance. It is at this latter point that a pass into the Wairau commences; and I then formed an opinion, verified by subsequent investigation (as I show in the geological part of this report), that the former outlet for the waters of this lake was the valley of the Wairau.

Continuing our route, I had an opportunity of admiring, at the southern extremity of the inner lake, one of the most magnificent views which Alpine nature could present. The long chain trending towards the south which separates the inner lake from the Wairau valley, and whose innumerable wooded spurs slope down to the water's edge, here appears to terminate quite abruptly. The lake itself winds between the mountains, becoming gradually narrower, until it is lost in a deep gorge; whilst at the extreme end of this gorge rises a rugged snow-clad mountain, towering above all the surrounding ones, and if possible exceeding them in majesty and wild beauty. On the south-western side of the lake lies a flat-topped mountain, about 4,700 feet high, the unbroken and softer outline of which contrasts agreeably with the rugged peaks and serrated summits of the other parts of the chain. I had no idea that such a jewel in point of landscape existed so near Nelson, and I am sure that the time is not far distant when this spot will become the favourite abode and resort of those whose means and leisure will permit them to admire picturesque and magnificent scenery.

As the evening was close at hand, we were compelled to return, and accordingly we crossed the low hills forming the promontory between the two basins of the lake.

One of the next days was devoted to the survey of the eastern end of the lake, and although on its north-eastern side we found a considerable quantity of level land stretching towards the mountain chain, we had, after passing over a few miles, to scramble through the forest, and along steep spurs jutting into the lake, the water here being too deep for us to follow the line

of the shore. Here I found on the pebbly shore, under some small scrub, and surrounded by tufts of grass, a deliciously cold mineral spring, of an agreeable alkaline, ferruginous taste, the position of which I have marked on the map. Unfortunately, rain set in again, so that it was not without great inconvenience that we could finish the task of this day.

Next day we were detained in our tent by heavy rain, which gave us our first opportunity of learning that patience which we were afterwards compelled to exercise to such a trying extent during continued rainy winter weather.

Notwithstanding we had plenty of provisions, having two pack-horses with us, the Maories of my party (which I may here mention consisted, besides myself and Mr. Burnett, of three Europeans and two Maories) were busy catching woodhens and eels, which last abound in the Roto-iti, and we all began to prepare for our anticipated future mode of subsistence by eating heartily of them. During our delay in the tent we arranged everything for our ascent, on the next day, of the great mountain to the south of the lake. I selected this mountain (which I have named Mount Robert), because, not only did it seem to present fewer difficulties, but also because I felt satisfied that I should obtain from its summit extensive views towards the north and west, as well as over the southern portion of the inner lake.

We started on the 17th of January at daylight, crossed the Roto-iti river, and after scrambling for nearly a mile through a dense scrub of manuka and wild irishman, reached a spur running from the mountain in a westerly direction. This spur was covered with black birch forest, and although very steep, and in some places mossy, we reached a platform, somewhat below the summit, at eleven o'clock. Here we found snow-grass, and other Alpine plants, covering the surface of the ground. From this height, about 4,600 feet, I obtained a magnificent view over the whole country, between Separation Point and the mouth of the Wairau river, which lay spread like a map before us. The Wairau valley particularly attracted my attention, and appeared to lie in a direct line with what I am now satisfied was the former outlet of the lake. At this spot I first noticed an Alpine flora, and that the trees for several hundred feet below the plateau had become dwarfish. Towards the east rose chain above chain of wild and rugged mountain peaks, whilst deep below lay the blue waters of the lake, on the shores of which glittered our white tents, the only visible sign of human existence in the vast wilderness around us. Towards the west rose high rocky mountain chains, only broken through where the Buller pierces them on its course towards the sea; on the south our view was shut in by the rocky spurs of a huge mountain. As I was very anxious to have a more extended view in that direction, I hoped to obtain it by following the mountain ridge.

Mount Robert falls abruptly off towards the west; towards the east it has three spurs falling towards the southern part of the inner lake, and between these spurs lie large valleys, hollowed to a depth of 1,200 or 1,500 feet by the action of the mountain streams, and containing basins filled with deep green water. In about two miles-and-a-half we had to rise 1,500 feet, in order to reach the summit of the mountain. The ridge was in many places so narrow that there was hardly space sufficient for our footing. The surface of the ground was covered with a most interesting vegetation, a perfect carpet of Alpine flowers, among which the spear-grass raised its rich yellow stalk, the whole here and there surrounded with snow. From its highest point, Mount Robert falls abruptly to the south.

A deep valley here intersects the chain, through which a small stream runs towards the Roto-iti valley. At this point I commenced my topographical and other observations, the results of which, as well as the altitudes of the mountains which I ascended, will be found in other parts of my report.

I must confess that the view over the sea of mountains by which I was surrounded quite bewildered me, and it was only after some time that I succeeded in reducing into order their various systems. From this point we expected to have seen Lake Rotoroa, which, however, we looked for in vain, although a very broad and long valley indicated the direction in which it was to be found. Contrary, however, to our expectation of getting a more extended view to the southward, we found it still shut in in that direction; but between the high chain south of the Wangapeka and its continuation towards the south, a large opening was visible, through which we saw a number of round-topped hills of every degree of elevation. Some of these were perfect cones, the regularity of which was surprising. They were all clothed with wood to their very summits, giving a pleasing variety to the landscape around us. Notwithstanding the sun was shining brightly, the atmosphere was sensibly cold. The Maori who accompanied us made a fire of grass, which we felt extremely comfortable. It was past four o'clock before I had finished my observations, and we started with all possible speed on our return to the tents, leaving, with regret, the grand mountain scenery around us. It became dark as we descended the mountain, and fearing to be benighted, I decided on making a straight line to the lake, by a nearer and more northerly spur, instead of following that by which we had ascended, which was longer, and densely wooded. After a long and fatiguing descent, we reached the banks of the lake, round which we were compelled to follow our way by starlight. Unfortunately, however, the banks were steep, and covered with dense overhanging vegetation, so that we had at times to wade breast deep through the water, or to climb over huge masses of rock. Some of my party, whom

I had left at the camp, had lighted an enormous fire to guide us, and it was not without many tumblings, and other adventures, that we arrived at the Roto-iti river at nine o'clock, and at our camp at ten, to reach which we had, as a sort of *bonne bouche*, ultimately to scramble through a dense growth of wild irishmen, lawyers, and other prickly plants, which horribly retarded our progress.

There is no need to say that we slept well after this day's work. I spent part of the next day in making notes, sketches, &c., and in the afternoon ascended a beautiful pyramidal hill, about two miles from our camp, and rising some 500 feet above the level of the plain.

On the 18th of January we struck our tents, and started for the Howard, from whence, according to Mr. Brunner's information, we had to make our way to Lake Rotoroa, the Lake Howick of the maps. We were directed to follow the River Roto-iti for fourteen miles; and it was with great pleasure that, after travelling about five miles from the lake, we met Mr. Mackay and his nephew Alexander, who had come from the Howard to meet us. They had camped on the Howard, which they had reached from Nelson, on the previous day. Mr. Mackay conducted me to the end of the high terrace between the Roto-iti and the Lake-house valley, where he pointed out to me a granite hill rising through the old alluvium. It was from this point that I first obtained a complete view of the high mountain chain, called by my friend Mr. Travers the Spencer mountains, whose highest peak, clad with eternal snow, rose grandly above the low hills in front of it. I named this mountain Mount Franklin, in honour of the late Sir John Franklin.

The name given to the gorge through which the Roto-iti flows (the Devil's Grip), led me to believe that it would be impossible to construct a road through it; and I was therefore much surprised at finding, instead of rocky precipices, only numerous wooded spurs, sloping to the river at easy angles, presenting no serious difficulty to the construction of a bridle track. The name had been given to it by its first explorers, whose garments had been destroyed in their attempts to get through the dense growth of wild irishmen and lawyers, with which the lower ground is covered.

On reaching the Howard, we expected to see Mr. James Mackay, junior, Assistant Native Secretary for this district, who had contracted with the Provincial Government of Nelson to explore for an available road to the Grey district, and who was now on his way to that country for the additional purpose of buying land from the Natives on the West Coast. He had, however, gone through the Devil's Grip on the previous day, intending to reach the river flowing from the Rotoroa lake at its junction with the Roto-iti. On the following morning I started,

in company with his father, to explore the valley of the Howard, which we ascended for six miles, and having reached a point at which it runs towards the mountains in an easterly direction, we returned, and ascended several spurs on its western bank, hoping to find an easy track to Lake Rotoroa. It was not without much scrambling that we at last succeeded; and, after having blazed the line for two miles through the bush, we returned to our camp, where I found Mr. J. Mackay, who had just got back from his exploration of the Devil's Grip.

Nothwithstanding it rained heavily, I started next morning with the Messrs. Mackay up the valley of the Howard, following the track cut the day before. After walking for some miles on the ridge, we found that it sloped down, which induced us to take a more westerly course. Following our new line, we reached a small valley, partly covered with grass, and partly with deep moss and rushes. Here we camped, naming it Camp valley.

The following day I was occupied in examining the country in a geological point of view, Messrs. Mackay and Burnett ascending the mountain in the direction of the Rotoroa lake, for the purpose of selecting a good spur and blazing a line. They returned in the evening wet to the skin, and reported that they had seen the outlet of the Rotoroa through the clouds and mists at their feet, and that according to their belief there would be no difficulty in reaching the lake.

We held a council of war, after which I determined to continue towards Lake Rotoroa, by the way which they had explored, from thence to follow along the course of the Mangles into the Tiraumea plains, and then down the Tutaki river to the Buller.

Mr. Alexander Mackay was in the meantime to return to our camp at the Howard, follow the Devil's Grip down, cross the outlet of the Rotoroa, blaze a line to the Tutaki, and there meet us with the rest of our men and the provisions.

As from the Howard we had sent back the horses, and from thence were compelled to carry everything on our backs, I made a fresh selection of the articles taken with us, and kept only what was strictly necessary in the shape of clothing to last us until we reached the Grey. I also sent back the botanical, geological, and other specimens which I had collected, and some of my instruments, keeping only such as were absolutely necessary for the purposes of my exploration. After this selection, I had still left a prismatic compass, a pocket sextant, two aneroids, four thermometers, and an apparatus for ascertaining altitudes by boiling water. Mr. Mackay, senior, who, to his great regret, was compelled to return to Nelson, was kind enough to take charge of the articles sent back.

As I expected two of my party, who had to come up from the Howard with provisions, I remained here, while Messrs. Mackay and Burnett started forward (so as not to lose any time) to blaze

the track over the mountain. During this stay I occupied myself in exploring the country in every direction around. In the evening my men came up with the provisions, and Messrs. Mackay and Burnett also returned, and reported that they had blazed over the mountain ridge, until they had seen below them the blue waters of the lake.

It was very rainy the next day, but having already lost several days in looking after a good track over the ridges, we determined to start. The higher we ascended the mountain the worse the weather became, changing from incessant rain in the lower grounds to snow as we neared the top; the cold chilling us severely, as at this season of the year we were not prepared for it in the way of clothing. Here also we met with an additional difficulty, as we were for a long time unable to find a good spur by which to descend to the lake. As night was close upon us, we descended as fast as we could, but soon discovered that we had selected a so-called blind spur, which fell abruptly into a deep gully, through which we tried to reach the lake. Owing, however, to the density of the vegetation, interwoven as it was with numerous creeping plants, and encumbered with fallen and decayed trees, we were compelled to re-ascend the side of the spur at an angle of at least 60 degrees. It was quite dark when we reached the top of the spur, which sloped rapidly towards the lake.

As it was impossible to continue our journey in the darkness, we found (after some searching) in the steep side of this spur a little hole which had formerly held the roots of a large tree, and here we camped, lying huddled very close together. We had great difficulty in obtaining water, as the Maori, Dick, who had gone down the hill in search of some, could only maintain the direction in which he proceeded by our continually cooie-ing to him. He returned in about half-an-hour, climbing up the almost perpendicular side of the spur, and told us that he had had to go down at least 400 feet before he could find any. During the night we heard, for the first time, the call of the kiwi, which, notwithstanding our discomfort, gave some degree of interest to the strange scene around us.

Starting the next morning with a bright sunshine, we were not a little delighted to see, at a short distance before us, a most magnificent lake, stretching far away towards the south-east, and which we soon reached, after crossing a large flat at the eastern side of its outlet. I had been told that it was impossible to cross this outlet, on account of its depth and the rapid flow of the water, and I therefore thought of constructing a raft; but, on examining the river near the side on which we stood, it appeared to be fordable. Mr. Mackay, therefore, began to cross, leaving his load behind him, and he found that the river, which was here at least 100 yards wide, was perfectly fordable; so he came back, and we all crossed, the water not wetting us above our hips.

Camping on the western side of this outlet, I devoted one day in examining the neighbourhood of our camp. On walking about a mile down its eastern side, I found, close to a little ferny hill, one of Mr. Brunner's old camps, near which were plenty of fresh water mussel-shells (unio), and some felled trees. My men had gone eel catching, having crossed a little rivulet on the western side of the outlet of the lake, and in doing so came to another camp, and found the letters B, H, and F cut on a tree, which satisfied us that this also had been one of the camping places of Messrs. Brunner, Heaphy, and Fox, on their visit to the lake many years ago.

The view from the outlet towards the end of the lake is magnificent. High rocky mountains form the back ground, whose bold outlines and patches of snow add very much to the beauty of the scene. A large valley runs from the upper end of the lake towards the mountains, and at a distance of about three or four miles up, the river flowing through this valley forks, its branches running parallel to the mountain chain. On the southern side the chain terminates in a mountain rising into the form of a cupola, after which it falls abruptly. Further to the south lie the Spencer mountains, whose peaks rise high above the numerous wooded spurs at the south-western end of the lake.

These wooded spurs descend on both sides to the water's edge, and the colour of the water changing there from a clear green to a dark intense blue, reminded me in this respect of the appearance of some of the most celebrated lakes of Switzerland, which it fairly rivals in beauty and grandeur. How much I should have liked to have built a canoe, and sailed over this beautiful expanse of water, may be easily understood.

The next day we employed in measuring a base line, but owing to the overhanging vegetation on the margin of the lake, we were obliged to do so in the waters of the lake itself, wading as far round as was possible. From the north-western side of the lake a mountain rose, which I called Mount M'Lean, and although it appeared to be covered to its summit with dense vegetation, I determined to ascend it, in order to obtain a better topographical view over the country, and to make some geological observations.

Mr. Mackay joining us, we started on the following morning, and arrived at the summit about noon; but we found it impossible, notwithstanding we had attained an altitude of almost 3,700 feet, to obtain a complete view, owing to the dense vegetation, although here and there we had fine partial views in various directions. This would offer a great obstacle to a survey of the country, where no higher mountains existed, and I therefore in future always selected those whose apparent altitude and bare summits satisfied me that I should not be disappointed. It is not necessary to state that the ascent of high mountains, and travel-

ling through wild wooded country, whilst carrying a heavy load, is full of difficulties. In the one case we have deep ravines, precipices, and rugged ground to go over; in the other, owing to the impervious character of the vegetation, and the deep mosses with which the ground is sometimes covered, and in which one sinks to the knees between the roots of living, or the decaying remnants of dead trees, progress is laborious and slow. Notwithstanding, however, the hardships we endured from these, amongst other causes, we at least had one comfort attached to this mountain travelling, for in the higher regions we were left unmolested by those very trying plagues, the sand-flies, which, at all times sufficiently troublesome, became almost intolerable if one happened to be occupied in writing, mapping, or sketching. In my subsequent observations upon natural history, I will speak more fully upon this explorer's scourge.

It was evening ere we again reached our camp, and we saluted with joy the last beams of the sun, only visible to us through the clearing we had made at the outlet of the lake. I had not then been accustomed to pass weeks in the dark tawai forest. A night's hearty supper from an eel, weighing at least ten pounds, which had been caught during our absence, refreshed us after our mountain trip, and I was very soon engaged in my usual evening occupation of noting down the more prominent features of the day's work.

The next day it rained very hard, so that we could not fulfil our intention of starting for the Tiraumea plains. Those who have not passed some time in the bush can never know what it is to be compelled to wait for fine weather in a moist tent.

Saturday, the 28th of January, being a fine day, we rose at daylight to start. We had always a very good alarum in the form of the thousands of sand-flies, which commenced their vigorous attacks at daylight, and invariably succeeded in drawing us from beneath our blankets. We followed a small rivulet which flows from Mount Baring, for three miles, crossed a low saddle, and struck the Mangles, the valley of which is in many places narrow and confined, and it was not without some difficulty that we climbed over the dead and rotting trees which encumbered the ground. In the afternoon it rained again, and the forest being still wet from the previous day's shower, we went down to the bed of the stream, and thus proceeded, which gave me an opportunity of examining more closely the interesting formation of the country. Seeing that we could not this day reach the plains, we camped, and the next day continued our march by the side of the stream, which soon became broader from the many tributaries descending the mountain sides. The hills became less high and steep, and after about a mile and a-half's walk, we reached more open ground, covered with fern and grass. On the eastern side of the valley was a hill about 500 feet high, covered with fern,

which I ascended as a topographical station, and from which I had an excellent view of the valley, towards the north. Here a splendid mountain rose about 5,000 feet high, with three distinct peaks, surrounded wholly by lower hills; and it appeared clear to me that I could not make a better selection than this mountain presented, for the purpose of a topographical station. From the bearings taken here, it was evident that it lay at the south-western side, near the junction of the Roto-iti and Rotoroa, which together form the Kaiwatiri, or Buller river. I determined to return up from the Tutaki to this spot, in order to ascend it, naming it after the great English geologist, Sir Roderick Murchison. We followed the river down, passing over some very scrubby and swampy ground; after which we reached a large grassy plain, in which three rivers united. Here we camped, in order to give me time for my observations. The weather was very fine, and we doubly enjoyed the warm sunbeams, after having for some days travelled in dense forest.

The next morning we started down the Tutaki, which now appeared a very pretty river, and after a walk of two miles across grassy terraces, we again entered the forest, but finding that walking was easier and far better in the river-bed, we again took to the water, and only at those places where the river entered a rocky gorge, or formed falls (some of which were of the most romantic character), did we again use the banks. The terraces continue here also, and contain much level and good land, in some places from half-a-mile to a mile broad, and which, when a road is formed through the district, will be valuable for settlement. Our provisions here began to fail, but catching some eels and whios (blue ducks), they made a good addition to our scanty commissariat. At noon we arrived at a very beautiful waterfall, shaped like a horse-shoe, ten or twelve feet high, and called by the natives Temai, falling over tertiary rocks.

Since we had entered the Tiraumea plains, the formation of the country had entirely changed, and instead of granitic, hornblendic, and eruptive rocks, with metamorphic schists, it was composed of tertiary fossiliferous sandstones, clay marls, and conglomerates. The country, which had been rather hilly for the last mile, opened again, and flat land on both sides of the river appeared, covered of course with dense vegetation. The river, too, deepened a good deal, and we had again to take to the bush, and camped, after a walk of another mile, on its banks. I had noticed during the preceding day that the vegetation began to change; totara, kahi-katea, and other trees were intermixed with the tawai (black birch), which had till then been the reigning forest tree.

Tuesday, January 31st, brought us, at noon, to the junction of the Tutaki with the Buller. After having walked several miles through the bush, we could not but admire the superb scenery here presented to us; the river breaking through and falling over

high perpendicular cliffs of conglomerate, and forming a succession of beautiful falls. On examining these cliffs, which consisted partly of conglomerate and partly of sandstone, I found some trees changed into brown coal; at another place a seam of coal, about four inches thick, from which I obtained several specimens of the tertiary fossiliferous flora and fauna. The junction of the Tutaki with the Buller is most picturesque. The former is a very rapid stream, winding over and between rocks, into the deeper flowing Buller, which here also forms rapids. After uniting their waters, the Buller disappears, making a sudden turn to the south.

It was in vain that we looked for our men, whom we had ordered to join us at the Tutaki; so, presuming that they might have experienced some difficulty in coming down the river, we started to meet them. Ascending the Buller for about a mile, we heard a voice from the opposite side of the river. It was Puaha, Mr. Mackay's native, who by himself had come down to meet us, and from whom we heard that Mr. A. Mackay had found some difficulty in carrying the track along the rugged banks of the Buller, for which reason he had struck a course overland, passing through a valley in order to reach the open country, the Buller having here terraces from eighty to one hundred feet high, with a deal of level land upon its banks. At every turn the river took we could look down upon its swift, unceasing, and, at times, most turbulent course, which lay as it were at our feet; whilst three rugged, serrated peaks of an isolated range, still in parts covered with snow, formed the background, rising to a height of 7,000 feet, which I named Mount Owen, in honour of the great English paleontologist, Professor Richard Owen. We camped on the sandy beach of the river, and awaited, with much impatience, the result of a fishing party, for we had had nothing to eat, save one small piece of damper, during the whole day. We heard with pleasure the death blows on the heads of the eels, of which several were caught, and which disappeared very soon after they had been roasted.

After old Puaha's communication, we knew that the following day held in store for us a long walk, and we half fancied that it was impossible to reach the encampment at the junction of the Rotoroa and Roto-iti before night. We started in the morning with daylight, for our breakfast, which consisted only of biscuit, had been speedily despatched. After a walk of two miles, we crossed a good sized stream, flowing from Mount Murchison, to which, therefore, I gave the same name. On both sides of this stream we found some nice level land, but after crossing it, our difficulties commenced, as we had to climb and descend alternately cliffs almost perpendicular, and standing at a height of from 150 to 200 feet above the river. The vegetation fortunately afforded us assistance in our climbing exploits, and by holding on to it we

were enabled to secure our foothold, otherwise we could not possibly have passed the rocky cliffs which bordered the river, and around which it broke foaming and roaring.

After ten miles hard walking (a truly Herculean task), we reached a turn of the river, and came upon an open basin, covered with manuka and koromiko, through which the river ran in several channels. As evening was fast approaching, and the native informed us that we had still far to go, we determined to camp. Mr. Mackay, and the Maori with him, having nothing to carry but their blankets, proceeded to the junction, which he reached late at night, after a hard scramble through the forest, and occasionally wading in the river. We had now no provisions left, so there was not much trouble in getting supper. Hearing, shortly after camping, one of my men shouting with joy, I almost thought that he had discovered a golden nugget upon the river's bank; I soon learned, however, that it was a weka (woodhen) which he had caught; a second soon followed it, and it was not long before our meal was prepared and vanished.

The next morning, February 2, at eight o'clock, Mr. Alexander Mackay arrived, having made seven miles through the bush to bring us some provisions, for which kindness I shall always remain indebted to him. He conducted us back, for the first two miles, over the open tract of land on the river's bank, and then through the bush, where we found a good blazed line, which brought us, after a walk of some hours, to the open terraced fern flat at the junction of the Rivers Rotoroa and Roto-iti. The weather, for the last five days, had been very fine, and for some days more continued so. My first object was now to look over the stores, and I found that, having spent so much time at the lakes, and having had to go twice over the same ground, the provisions left would not last us until our arrival at the Grey. As I intended ascending Mount Murchison for observations, and as this would occupy me a few days, I sent four of my men to Mr. Hooker's, at Motueka valley, for flour.

The next morning Mr. Mackay started for the Grey; and it was not without regret that I saw him leave, as, besides being an excellent bushman, he had been an agreeable companion for the last fortnight. I, however, arranged that I should follow in his track, and give a fair account of the road he should select for the purpose of uniting Nelson with its so long neglected West Coast.

I may here add, that having, besides my geological researches, a topographical map to construct, I could not travel so fast as I would have wished. This will always be a great drawback to the scientific exploration of a densely wooded country, where nothing worthy of notice in the shape of provisions can be obtained, and where you have to depend entirely on what you carry for supplies.

On the 4th of February, accompanied by Mr. Burnett, I started to ascend Mount Murchison, which rose boldly above the valley. I selected a spur at about three miles distance from our camping ground, as apparently offering the easiest gradient.

We had to follow the Buller down for some three or four miles, through dense bush, having to cross several streamlets which flow from this isolated granitic mountain. About four o'clock in the evening we reached an elevation of some 2,500 feet, and finding no water, we determined to camp, as we should have to descend for it nearly 600 feet, into one of the valleys below.

Next morning, at daybreak, we started, leaving behind us our blankets, as we intended returning by the same road. We hoped to find water higher up, but having reached an altitude of 4,000 feet, we were not a little disappointed at seeing all the gullies dry, for we had had for breakfast only a few drops of tea reserved from the meal of the previous evening, and the sun, which was rising, was becoming very warm. We determined, therefore, not to proceed higher without water; and, whilst I examined the outcropping rocks which were here visible, Mr. Burnett went down for a billy-full of water, for which he had to descend some 1,200 to 1,500 feet through dense bush, and at a very steep angle. This delayed us for several hours. We therefore made the greatest haste to reach the summit, having to make our way through a thick growth of sub-Alpine vegetation for 200 feet, which had taken the place of the black birch forest.

I had in my load a tin case containing instruments, and to this our damper had been tied; but in scrambling through brush, which at each movement caught my load and frequently retarded me, the flax broke, and our intended dinner and supper were lost, but hoping to reach camp before night, we treated our loss lightly, and proceeded on our ascent as quickly as we could. It was two o'clock, p.m., when we arrived at the north-western summit of the mountain, which was dome shaped, and covered with snow-grass intermixed with beautiful Alpine flowers. From this point we obtained, principally towards the north, a magnificent view of the wild mountain chains, whose rugged peaks had assumed shapes that it would defy the wildest imagination to conceive. It was here that I first obtained a complete view of the river which I have named the Owen, and of the low saddle between it and the Wangapeka, over which appeared the Mount Arthur range.

Towards the west the same scenery was visible, but more towards the south I saw the large valley of the Buller, and obtained some idea of the extensive plains of the Matakitaki and Matiri. I could also follow the course of the Buller through the last mountain chain towards the west before it reached the sea. The high rocky chain of the western side of the Matakitaki plains continued in a southerly direction as far as the eye could reach, and seemed apparently unbroken.

But I was not a little gratified on observing that my expectations of finding an opening towards the south through the island, were realized as far as I could see. Along the eastern side of this opening the glorious chain of the Spencer mountains again appeared, prominent among which Mount Franklin showed his snow-clad sides. Unfortunately, and unexpectedly, a rise in Mount Murchison towards the south-east prevented my seeing in the direction of Lake Rotoroa, so that I determined at once to ascend the second peak of this mountain. We had to descend for 500 feet, and to climb up the second peak, which here presented very slippery sides, whilst the summit consisted of a very narrow ridge, which fell abruptly on both sides. After reaching the top of the second peak, we were again disappointed, for we found before us a still higher one. Between the second and third, the sides of the mountain fell almost perpendicularly, and were covered with smooth snow-grass, presenting nothing which we could take hold of to assist us in our descent, whilst the saddle over which we had to pass was scarcely broad enough for our footing, and sloped almost perpendicularly on both sides for 1,500 feet. It was not without the greatest care that we managed to descend, and again climb up to the third and highest ridge; but when at last we had arrived there, we were gratified with a noble view. The Lake Rotoroa, its outlet, the rivers which supply it, and the Tutaki and its tributaries, lay before us as on a map. The large opening towards the south was visible, interrupted here and there by hills presenting the appearance of regular cones, which gave to this view a variety most difficult to describe.

It was six o'clock before I had finished my observations, so it being impossible to reach our camp before dark by the way we had come (as we should have to climb over the two peaks between us and it), we determined on descending by the first favourable spur, hoping that by following it till sunset, we should be able to descend into the gorge below, and thus camp near some water. It is needless to say that we hurried down through what, fortunately, proved to be not very close vegetation, on the back of the spur, and had made some considerable distance, when, as night was fast approaching, we were obliged to descend a very steep side of the spur towards the water. It was quite dark when we reached it, and prepared to camp, having for our supper only a drink of deliciously fresh water. Remembering that I had a candle in my box, I suggested that, as it was a fine calm night it should be lighted, and that we should follow the stream, and thus perhaps reach the Buller. This we did, but not without many falls and sundry other misadventures. When we did reach the Buller it was half past nine o'clock, and it was full time, for our candle had burned so low that it had become almost impossible to hold it between our fingers. We then continued our course down the

Buller by moonlight, and succeeded in reaching our camp about ten o'clock.

The next day Mr. Burnett ascended the mountain for our blankets, during which time I occupied myself with sketches, and in completing my geological notes. Another day was devoted to ascend the Rotoroa river, which flows rapidly towards its junction with the Roto-iti. It was now that I expected the return of my party sent for provisions, but they did not make their appearance. On the following day, therefore, I occupied myself in washing for gold, and was not a little gratified at finding that both the Rotoroa and Roto-iti were gold-bearing rivers. In order not to lose further time, we again started, on the 11th of February, swagging part of the provisions, &c., down the Buller, and camped six miles lower down on the flat. Mr. Burnett returned next day to fetch the remainder of our loads, during which time I examined more closely the adjacent country. In the evening he came back, bringing with him two of the men whom I had sent for provisions, and who had had to go to Nelson. The other two had preferred remaining in Nelson, as one of them did not feel strong enough, and the other was afraid to cross the rivers, so that F. Beckman, whom I had entrusted with this mission, had been obliged to engage two others in their place. The next day, the 13th, my men started back to get a quantity of provisions which they had left at the junction, and Mr. Burnett and I crossed the Buller near our camp (where it is divided into three streams, offering an easy ford), for the purpose of examining the River Owen, whose junction with the Buller was two miles below us. We went three miles up the Owen, which is a very pretty river, and I found, as I had previously observed from the top of the mountain, that there was a good deal of level land on both its banks, consisting of bush and small grassy patches.

On the 15th of February, everything being arranged for our start towards the Grey, we left our camping ground very early; but, having more to carry than we could manage in one trip, we advanced six miles, and my party then returned and brought up what had been left behind. Mr. Mackay had selected another road, for the purpose of avoiding the rocky cliffs near the river, and which, though much better, contained some steep hills, which we had of course to ascend. Finding that it would be more convenient, and would save the necessity of passing three times over the same ground, we determined to carry everything at once, instead of dividing the loads; we therefore re-distributed the things, and found that though each individual's load was between seventy and eighty pounds in weight, we could thus make better progress.

Next day our road followed the high and almost level terrace on the bank of the river, and after six miles of hard work we camped. Beneath us flowed the Buller, between its rocky walls,

whilst in the background lay the towering peaks of Mount Owen. The ground on which we camped being mossy, much care was necessary to prevent the moss from taking fire; but, in spite of all our precautions, it spread under ground, and we were compelled to shift our camp during the night. The fine weather, which had so long favoured us, now began to change; heavy rain set in, and, fearing that we might be delayed at the Tutaki, unless we crossed it at once, we started very early, and were soon wet to the skin.

It was fortunate that we had not delayed, for on reaching the river about two o'clock, the water rose to our hips, and flowed so rapidly as well nigh to wash us off our feet. In two hours afterwards the river had risen three feet more, so that it would have been impossible then to cross.

Here we camped, and for three days had continual heavy rain. It was a scene of wild beauty. The two rivers, whose waters united close to our camp, rose by degrees higher and higher, dashing between the high rocky water-worn cliffs, which here narrow the main river to about thirty feet, the water rising fifteen feet in a very short time. During the time we were delayed here we washed for gold in the neighbourhood of our camp, and succeeded in finding many very pretty specimens. We now placed ourselves on rations, which however was not agreeable to some of my party.

The weather changed on the 21st of February, and we continued our journey towards the Mataki-taki plains, over a flat and very high terrace, which gradually became lower as we advanced; and, after travelling for three miles through the bush, we found that it was not much above the level of the river. Here Mr. Mackay's track led to the river banks, and all signs of a track became lost in the shingle. It was evident that he had crossed here, and followed the sandy pebbly beach on the other side. The river being still high, I tried to cross; but having soon found myself breast high in the rapid water, and finding that I should be washed off my feet if I attempted to proceed, I was obliged to return. This was very annoying. Stopped by the river, and not knowing how long it would take before we could cross, we had to camp, and await the lowering of the waters.

The views over the Mataki-taki plains towards the north, east, and west were really charming, extending as they did over a large level country, in most part covered with dense forest, above which appeared high mountain peaks. Towards the west rose a continuous rocky chain, which I named after Sir Charles Lyell, with its magnificent needles and points disappearing behind a conical granitic mountain, lying in the centre of the plain, and descending abruptly to the Buller, whilst at its eastern base flowed the Matiri, and to the north-east the peaks of Mount Murchison appeared over the low wooded mountains in front of it.

The next day, in lieu of the river falling, heavy rain descended, which of course delayed our crossing; so, not knowing how long we might be detained here, and seeing that our provisions were rapidly diminishing, I determined to send back part of my men and move forward with the remainder. I selected those who could swim, sending three back to Nelson, so that (besides Mr. Burnett) only Frederick Beckmann, William Hunter, and the native, Richard Kemp, remained with me. I gave orders again to wash for gold, and every dishfull of dirt yielded some specks.

The next day being fine, I crossed the river by swimming, and, following the northern bank downwards, soon came upon Mr. Mackay's track. In the meantime I had sent the native down the river on the side on which we had camped, to search for a ford. He returned in the afternoon, telling us that he had found a capital ford a mile lower down, which, notwithstanding the swollen state of the river, had taken him only to his hips. We at once struck our tent, and followed him to the crossing place, at which we pitched it again. Whilst the men were engaged in doing so, I tried the ford and found it practicable.

The next day, the 23rd of February, after crossing the river, we continued our way on its northern bank for two miles through grass and manuka. The view southwards, up the Mataki-taki valley, was very picturesque. This valley is from two to three miles wide, and has on both sides densely wooded hills, over which, on the south-western side, a high rocky mountain chain appeared. Two miles east from the entrance of the Matiri, opposite the entrance of the Mataki-taki, a terrace covered with forest begins, and here we found a ford, at which Mr. Mackay had crossed.

I left my party, whom I ordered to try and cross the Buller, which was still very high, by this ford. Mr. Burnett and I went down to the junction with the Matiri, the waters of which were high, and of a dirty yellowish colour. We followed up the stream for a few miles, in order to examine its course, and the available land upon its banks, &c. On our return I found that two of my men, who had tried the fords, had found them impracticable without swimming, which was impossible with our heavy loads.

The southern side of the Buller consisting of level land, I did not see why we should not continue on that side, and I imagined Mr. Mackay and his party had only crossed and travelled on the northern side, in order to profit by some open land; and in this opinion I was afterwards confirmed. We therefore returned to the place whence we had started in the morning, crossed the river again, and made our way by the southern bank. I must confess that I felt very tired after this day's journey, not having been accustomed to carry a load of seventy pounds weight on my back; it almost broke me down, and I had to summon all my energies in order not to remain behind. Exploring in other countries,

where one can make use of horses and other beasts of burden, is comparatively easy, and there is little fatigue in pursuing scientific investigations during temporary halts of the party, and in completing notes and journals whilst they are resting at night.

The next morning we started early, the weather having again become fine; but we had some difficulty in working our way through the thick bush, interwoven with numerous supple-jacks and lawyers, on our road. Half-a-mile before reaching the Mataki-taki, we had the pleasure of meeting Mr. Alexander Mackay and his man Flowers, returning from the Maruia plains. They also had not ventured to cross the Buller, and had remained on the southern side. If it be a pleasure amid the bustle of a town to meet a friendly face, how much greater must it be to meet one in the wilderness! We remained a few hours together, relating our adventures, whilst my men prepared for our nearly starved out visitors a hearty meal, which, despite its homeliness, was not despised by men who for some time had lived on two biscuits a day. Wishing them a safe return to Nelson, and giving them some assistance from our stock of provisions, we parted, and again pursued our several ways.

After another hour's walk we reached the Mataki-taki. This river flows through a broad valley, and although we crossed it where it is divided into two branches, it was still very rapid and deep, and is in my opinion the principal tributary of the Buller. The mountains on the northern side of the Buller continued low, and there is a large flat between them and the river, covered in some places with manuka, tutu, and other scrub, and in others with high fern, through which (partly following Mr. Mackay's track, who had here tried to burn the fern) we continued our route, and camped in one of his old camps on the level ground. As I did not wish to leave this plain without ascending some mountain in the neighbourhood, in order to form a more accurate idea of the country around, I determined on ascending one about three miles distant from our camp, which had been called by Mr. Mackay Mount Francis.

In descending the river below the entrance of the Matiri, I had observed a very easy ford across the Buller, and on the following morning I sent two men back with instructions to re-ascend it as far as the Matiri, and wash in that river for gold. I, in the meantime, ascended Mount Francis, which is only about 2,200 feet high; but, although it was wooded to the summit, I obtained a very good view over the whole country, the sides of the mountain in some places being absolutely vertical. Towards evening I returned, as did also the two gold seekers, who had been unsuccessful, though they had washed for half the day.

Yesterday evening I had set fire to the high fern before us in order to have an easier walk with our heavy loads, and during the night it was a splendid sight to see the surrounding country in

flames, the ti trees amongst the fern appearing like distinct columns of fire.

The ground was still warm when we started on the following day, and after a two-mile walk we were again glad of the cool forest shade, as the sun was very hot. Our route now led us along the steep sides of the mountains bordering the Buller, where in places we had to climb over granite cliffs, forming perpendicular banks, between which the river was confined to a breadth not exceeding thirty or forty feet, the water in such places being so deep that it looked blue and stagnant. After a march of eight miles we reached the junction of the Maruia, which we had to ascend. Here we camped.

Notwithstanding that we were all very tired, three of my party went to fish, and returned with one large eel, a valuable addition to our stock. The Maruia is a very fine river, with clear water, and, for the first day's journey of six miles, offered few difficulties, having on its side good terraces, with a pretty clear forest. The totara, which we found very common in the Mataki-taki plains, and near the junction of the Buller with the Maruia, now became less common, and, at a distance of ten miles up the river, ceased to grow.

Following the Maruia, upon its eastern bank, for one and a-half miles, upon a mossy terrace, we had to cross the river, and notwithstanding that at this spot it was very broad, and divided into two arms, it was deep and rapid. Ascending the terrace upon the western bank, we followed Mr. Mackay's track, as indicated by some blazed trees. After another mile, we had to ascend a steep hill, which presented an almost vertical precipice, round which the river wound. Mr. Mackay had here descended to the river, and we followed his track, but finding that it would be impossible to carry the intended road over this ground, we reascended the hill, and endeavoured to find a better route further inland, in which we succeeded.

For five days we continued our route, trying to find the best possible track. We travelled partly on the high terrace, where at times we had to climb up and down almost perpendicular places; at others crossing and recrossing the river, which was very treacherous, its smooth waters appearing sufficiently shallow to permit us to cross it, whilst, in attempting doing so, we were frequently compelled to return to our former fords, in order to prevent ourselves from being washed down. All its tributaries of any importance flowed from the east, which may be easily understood, as the Mataki-taki is close to the Maruia, and for the first fifteen or eighteen miles they are only separated by low hills. We looked to the south, and observed a rocky mountain chain, to which each day we drew nearer. We had occasionally to ascend very steep hills, whilst at times deep gorges narrowed the river's course, and gave to the scenery a most romantic appearance. It

was only while walking in the river bed that we caught sight of the sun, the dense forest always forming a dark green roof above us. But this also had its charms, for at early dawn we were awakened by numerous feathered songsters, with their harmonious notes, whilst during the day the quarrelsome kakas amused us with their cries, and many coloured birds hopped and flew hither and thither around us, as if inquiring what intruders disturbed the quiet of their forest home. During the early night the cries of the owl and the kiwi resounded through the tranquil woods, and a few beams of the moon threw their silver light upon our tents through the overhanging foliage. It was always a happy moment with us when the tent was pitched, a large fire burning before it, and the day's work finished.

The Maruia winds very much in its course, its valley becomes more open previously to reaching the plains, but, as we ascended it, it diminished considerably in volume, owing to the number of tributaries we had left behind us. During this day (the third of March) we crossed it at least twenty times, the terraces of the plain appearing nearer to us as we advanced, and their vegetation having been burnt off by our predecessors, we could easily judge of their extent. On leaving the plains the river makes a sharp and long easterly turn: we ascended a steep terrace, 150 feet high, on its western bank, working our way through a mass of supple-jack, closely interwoven with wild irishman and other plants. We had now a splendid view all around us. Several grassy terraces rose one above the other to a height of from 200 to 250 feet above the river, and formed a basin from three to four miles broad, and from twelve to fourteen miles long, surrounded by high rocky mountain chains. In a valley on the eastern side, intersecting these terraces, we camped, and enjoyed exceedingly the pure air, the deep blue sky above us, and the beauteous mountain scenery around us.

In order to examine more closely the mountains on the western side, and to establish a topographical station, I determined to remain here for one day. I was always anxious, when practicable, to give a spell to my party, who, notwithstanding that now and then we caught an eel, with an occasional weka, began to feel the effects of half-rations; they complained very much of hunger, felt very weak, and I must confess, that I had to do my best to conceal the fact, that I felt in much the same condition.

The next morning I ascended the highest terrace to take the necessary bearings. The rocky chain, which, from the Mataki-taki plains, we had seen lying to the south, now appeared in the north. Between it and the serrated mountain chain lying to the southward (behind which the Mataki-taki flows) a large opening appeared, through which ran the principal tributary of the Maruia, joining it at the northern extremity of the plain. This mountain chain continued from the north towards the south, forming at the

south-eastern end a semicircle round a large isolated granitic mountain, which I named Mount Mueller, after the eminent botanist, Dr. Ferdinand Mueller, director of the botanical gardens at Victoria, who is now engaged in illustrating the botany of the southern hemisphere. The chain then turns slightly to the westward, in the direction of the Kopi-o-kai Tangata, or Cannibal's Gorge, after which it curves to the S.S.W. On the western side, a wild scene, exhibiting the boldest forms of mountain peaks, was visible, showing what great revolutions had here occurred in the earth's crust. After having also examined the mountain chain towards the west, we started again at noon, and, notwithstanding the weather was showery, enjoyed the fine scenery around us. The easy travelling over these grassy plains was also a pleasing change, and our walk was further enlivened by large quantities of quail, which, at every step, rose at our feet.

I here found it necessary again to inspect our provisions, which appeared to diminish very rapidly, and I found that they would only last us ten days, by confining ourselves to a small pot of lillipe (or boiled flour) twice a day, with a hoped-for addition of wekas or eels. Our gun, unfortunately, was useless, having been entirely spoiled by the wet in frequently crossing the rivers, without our having any means of protecting it from the water. Rain fell the next evening, and continued the whole of the succeeding day, but nevertheless we started, and camped near the high granitic mountain at the south-eastern end of the plain.

The following morning (the 6th of March) being clear, I observed that the granitic mountain to our east was bare topped, and as I was anxious to obtain a better idea of the mountain system on that side, I determined on ascending it, and started at seven o'clock with Mr. Burnett and the native for that purpose. Our provisions consisted of a pannikin of biscuit dust, and one roasted weka. After having worked our way for two miles through a dense growth of flax, wild irishman, &c., which we found extremely fatiguing, we reached the bottom of the terrace, about a mile from the foot of the mountain, and commenced our ascent. It however became cloudy and began to rain, and I soon saw that it would be useless then to attempt the ascent. As we could not afford to wait for fine weather, I was compelled to return to camp, much to my regret. For several days we had the same lament: rain! rain! We, however, started on the following morning (March 7), and leaving the Maruia, where it turns eastward towards the Cannibal's Gorge, we continued through the large opening towards the south, following Mr. Mackay's track, marked by flax and papers placed in the clefts of sticks. After a walk of a mile over very swampy ground, we reached the banks of a stream, which Mr. Mackay, from native description, called the Ruhu, and which we followed through the bush for some miles, until we reached a nice grassy spot. The rain, which poured

heavily during the day, compelled us to stop here, and, fancying that we could obtain some fern root, we camped.

For two days the rain continued to fall in torrents, and a little rivulet, which had had in it but comparatively few drops of water, rapidly rose at least six feet, whilst the Ruhu, previously a mere brook, rushed like a torrent past our tent. We remained here for two miserable days, during which we found it impossible to make a fire outside, or obtain dry wood, so that we were obliged to sit squatting together in our only tent, having sent back our second tent from the Mataki-taki plains. We boiled a little tea, and flour and water, with damp wood, which filled the tent with smoke, so that at times we could scarcely breathe or open our eyes. Mr. Mackay's Maories had already dug for fern root, and we found, beside their sticks, a large quantity which they had left, as being evidently unfit for use. The men, being very hungry (for during these rainy days I had placed the whole party on a single meal per day), went to dig for fresh fern root, but, notwithstanding we tried hard to eat what they obtained, we were unable to do so, as it was all nearly rotten.

These were two trying days, but I endeavoured to appear cheerful, in order to keep up my men's spirits, and to combat the discontent naturally caused by hunger and the very uncomfortable position to which we were then reduced. At length the sun again began to shine brightly, and on the 9th of March we started, ascending the course of the still swollen stream, and at times wading to our hips in the yellow, dashing, foaming water. After having proceeded a mile, I found a letter from Mr. Mackay, beneath a piece of bark, on a well marked tree. In this he told me "that the stream I was then ascending could not be the Ruhu, because, instead of flowing from the south-west, it flowed from the north; that he had in consequence returned, intending to follow the large opening towards the south, on the eastern side of which he expected to find the Ruhu flowing." We therefore struck across the plain, which was here from one to one and a half mile broad, and followed the faint marks left by Mr. Mackay's track. Leaving the forest behind us, we came to boggy ground, covered here and there with stunted scrub, and forming occasional swamps, through which we had to wade. After proceeding about two miles in this direction we came to a larger swamp, lying on the top of a saddle, from which water flowed on both sides, forming apparently the watershed between two large rivers. This filled us all with joy. For several miles we followed this desolate and dreary track, and evening was already close upon us without our having found a spot dry enough to pitch our tent. At length we reached a little terrace, on the mossy surface of which, amongst some stunted birch trees, we selected a spot suitable for our camp. The sun shone brightly the next day, and we continued on our road, full of hope, and found the river flowing S.S.W., the

direction of the large opening previously observed, which afterwards curved to the S.W. Seeing towards the north another large opening, with low, round-topped, granitic mountains, over which, on both sides, high rocky peaks appeared, I began to think that we had struck a tributary of the Grey, and that we should soon see that river, if we continued our course towards the southwest. After two miles we reached a large stream coming from the N.W., which, uniting with another streamlet from the N.E., formed a good sized river. Here again I found another letter from Mr. Mackay, of rather a depressing character. He had been kept here by heavy rain for four days, the same spell of bad weather which had detained us at the Tutaki; his provisions had run out; and he stated that instead of following the stream to the northwest, which would bring him to the Inangahua, he intended following down the one, we were then upon, thinking that it would bring him into the Grey, where he could get eels. Notwithstanding I felt certain that by going up this stream I should soon reach the Inangahua country, I preferred following it down, hoping to obtain a better view of the formation, and of the topographical character of the country, and I must confess that I have not regretted it. The valley continuing broad, with here and there nice grassy spots, brought us, after a walk of some hours, to the bank of a large river, which, breaking through the high and rocky chain to the eastward, spread over the valley in three distinct arms. Upon crossing them I felt convinced that I had reached the Grey; and that it had its source in the Spencer mountains, I judged from the large quantity of water it contained, and the character of its boulders. The view of the rocky mountain now became very striking, as over the round-shaped low granitic hills in the foreground, appeared high peaks, some of which formed regular pyramids, from 6,000 to 7,000 feet high, broken by deep gorges, through which mountain torrents, often forming magnificent falls, precipitated themselves into the rapid River Grey. As we were desirous of reaching the right bank, we searched for a good crossing place, which, after some difficulty, we succeeded in finding. The banks of the river being too steep to permit our following its edge, we entered the forest, which was much entangled and mossy, and full of fallen trees, rendering quick progress impossible. The river forming a continuous rapid, it was difficult to find any spot likely to contain the much coveted eels, and although, several times, we selected likely looking places at which we camped for that purpose, we did not succeed in getting any, which rather depressed the spirits of my party. Continuing along the right bank, on the next day we passed several nice waterfalls, in streams coming from the adjacent mountains, and seeing that the hills before us descended abruptly to the river, and that the left bank had a level terrace, we, with some difficulty, recrossed, and continued our journey on that side. Upon this

terrace, where it fell perpendicularly towards the river, I found a small cavern, excavated by the hand of man, in the clay, the roof of which still bore marks of the implement with which it was hollowed out, but I did not detect any other sign of human presence. This had probably been formed by some fugitive Maori slave, in years gone by. Every turn of the river now opened to our admiring eyes some fresh and beautiful Alpine scenery, and we also had ample opportunities for trying our remaining strength in crossing and recrossing it. I think it is really a miracle that we were not washed down by the large body of water which dashed so rapidly against us. On the following day we arrived at a spot where another river enters the Grey from Mount Hochstetter, so named by Mr. Mackay. There the Grey makes a sharp turn from the S.W. to N.N.W., offering a new series of splendid views. During this day we were very fortunate, getting an eel and three wekas, which restored our strength a little. It was only after a dreary march of three days, partly over grassy plains, partly through dense bush, and after climbing up and down steep terraces, that on the evening of the 14th of March, we arrived at the Alexander stream, from which, according to the information from Mr. Mackay, I could judge how long it would take me to arrive at the junction of the Mawhera-iti with the Pohaturoha, from which point the river is called by the natives the Mawhera, or Grey.

It was high time that we should have some prospect of speedily obtaining better rations, for during the last three weeks we had been without bacon, salt, and sugar, having nothing left but tea, flour, and oatmeal, and though, eleven days previously, I had calculated that our provisions would then last but ten days, I had so managed that we had still left sufficient for eight scanty meals.

The consequence was that we all felt very weak, but, nevertheless, we could have made better headway had not two of my party broken down. One of them, by nature thin, had become a mere skeleton, and two days before our arrival at the Alexander, whilst ascending a steep hill, fell, completely exhausted by hunger, exertion, and cold, it having rained during the whole day, and we having had to cross and recross the rapid river at least ten times, with the water often breast high. Of course I camped at once, and did all in my power to make him comfortable, each of us sparing from our scanty ration something to augment his meal. I must confess that I passed an anxious night, as the consequence of being compelled to stay here would have been of the gravest nature, and would probably have endangered the lives of the whole party. Finding next morning that he was better, we again contributed towards his ration, and dividing his load between us, started on our journey. At the end of two days he resumed his load, having regained sufficient strength to keep well up with the party. On the

following day the native asked us to halt at four o'clock, being unable to proceed further, but during the evening we caught some eels, which strengthened us all, and our subsequent arrival at Mr. Mackay's camp, at the Alexander, revived the men's spirits. The weather now remained very fine, and we continued our road, in the hope of speedily arriving in the open country upon the Grey.

I may here state, that from the time of leaving the Maruia plains, the geological and topographical features of the country filled me with the greatest interest, and although myself weak, and possessing but the wreck of what were once a pair of boots, which made walking over sharp stones very painful, the interest of the journey prevented me from giving way to any peevishness, and so, seconded by Mr. Burnett, I endeavoured to be cheerful, and to incite my party, by my example, to bear their privations as men ought to do.

I have not, of course, related the several minor accidents which happened to the members of our party, and which were natural upon such a journey. They were fortunately unattended by serious consequences, and merely gave rise to a laugh, in which the sufferer invariably joined heartily.

After having travelled for some days through the bush, crossing and recrossing the river, and having afterwards to ascend the terraces in consequence of the depth of the river and the steepness of its banks, we at length left the mountains behind us, and, to our inexpressible joy, found that we had entered the open country. The geological formation here changed, and instead of crystalline or metamorphic rocks, tertiary strata and old alluvium appeared.

On the 16th of March we reached a fine eeling station, and as soon as the sun went down we all started to different places in the deep water to fish, with the exception of one, who remained behind to keep up a large fire, and prepare the sticks on which to roast the first result of our sport; but although we sat for two hours no eels appeared, and three of us returned to the fire disappointed. The night, as had been generally the case for the last month, had become cool, and as we were sitting before the fire, the fourth and last of our party brought with him a very small eel, which, notwithstanding its diminutive size, was soon roasting upon a stick. Our situation would have afforded to a Schalken a fine opportunity for a splendid picture; our five figures, with their thin faces, and torn and patched clothes, standing round the blazing fire, gazing anxiously at our poor supper, whilst above us shone the beautiful, clear, starry sky of the southern hemisphere. On the next morning, after having well scraped our two bags to get the little flour adhering to them, by which means we made a more than usually large meal, intending to make, if possible, a long march, and to reach the Mawhera-iti, we started, and crossing and recrossing the river, which gradually became broader, we found the country still more open, and with grassy terraces occasionally replacing the

forest, which was largely intermixed with rimu, totara, kahikatea, and other valuable trees. After a short time, the forest on the northern bank was replaced by grassy terraces and large open tracts of country, with low hills visible here and there, this smiling country being bounded by a distant chain running north and south as far as the eye could reach. Having passed over a large open tract of land, upon which we travelled about ten miles, I looked for the Mawhera-iti, and soon saw a small river joining the main one. But notwithstanding it appeared to agree with the description in Mr. Brunner's journal, and with Mr. Mackay's sketch map, we could find no signs of the provisions which we ought to have found here. It was with anxiety that we looked all around us, often fancying that some mark in a tree indicated the desired spot; but we were disappointed.

We now continued our route close to the river bank, so as not to miss any river flowing from the north; and, after another mile's walk, reached the Otututu, a tributary of the Grey, flowing from the north. My whole party, without exception, contended that the first river we had passed could not be the Mawhera-iti, and that we had still to go some distance in order to reach it, and felt assured that at every turn of the river it would appear. I must confess that it grieved me to disappoint them, seeing, as I did, that the Grey, which till now had flown in a westerly direction, with a slight northern trend, here turned to the south-west, and that we were gradually nearing the gorge or break in the mountains in that direction.

After having crossed the river four times (which had now become very difficult, owing to the large body of water), we camped on its eastern side. Our circumstances caused my men to become serious, and, although anxious to do so, I could not succeed in introducing a joyful spirit into the camp.

I looked with interest at the numerous tracks of the wild dog, which here abounded on the sand, and would have much liked to have caught one, which I should have eaten without fearing the nickname of kai-kuri (dog-eater), applied by the natives to the first explorer of this country.

Before starting the next morning (the 18th of March), we partook of our last meal of flour and water, and notwithstanding that I had, as I conceived, clearly proved to my party that we had passed the Mawhera-iti, they would not believe it. The fine weather had, during the night, been succeeded by heavy rain, which now poured down in torrents. In the next few miles we crossed the river (which had become very broad and deep) several times, looking about anxiously for signs of our provisions. Unfortunately my spy-glass had been so often wet, that it had become useless, and owing to the thick mist we had great difficulty in discerning objects at any distance, our eyes being all we had to trust to. We were now on the eastern side of the river,

on which we continued for another mile, without finding a crossing place, the river being too deep.

Towards noon we arrived at a place covered with high fern; here I ordered a halt, as I did not know whether we should meet with any more fern land on our route. We all began at once to dig for fern root, and the rain having fortunately ceased, we lit a fire and had a meal. I must confess that this was a trying moment for me, looking at the sunken faces of these men, who had been my companions in so many trials, and watching their efforts to swallow their meal of fern root, whilst they themselves now began to fear that I was right in saying yesterday that we had passed the Mawhera-iti. It began again to rain heavily, but we followed the river bed, frequently endeavouring to get to the western side, as we knew that we should otherwise soon have to cross the Ahaura, a very large river, flowing into the Grey from the eastward, and that it might be difficult, if not impossible, for us to ford it so near the confluence.

We were in a critical position, jammed in between two large rivers, without food, and by no means certain that we had not already passed the provisions of which we were in search. Seeing that we were nearing the southern slopes of the great western chain, I was suggesting to Mr. Burnett that one of us two should proceed down the river upon a raft, in order, if possible, to bring up provisions, when we were aroused by the voice of one of the men, who shouted most lustily that he saw a Maori. The sound came like music to our ears; but on hearing our voices the Maori began to run away, and stopped only when Dick (*our* native), whose voice he knew, called out to him. He was much frightened, not having been accustomed to hear the human voice in these solitudes. It turned out to be Mira, a native from Collingwood, one of the party who was bringing up our provisions, and who informed us that they had been placed about a mile lower down, as the party bringing them up had been detained by the rains, and feared, if they attempted to bring them further, that they would have been spoiled by the damp. He also told us that there was a white man with them, and that Mr. Mackay (of whom we had not seen any trace during the last five days) had, after suffering much from hunger, arrived safely at the pah. He also told us that the vessel carrying the provisions having met with an accident, had arrived later at the Grey than was expected.

All weariness was forgotten, and, half running, we proceeded towards the encampment, which was indicated to us by the smoke of a fire. I must confess that I felt tears rush to my eyes when I was thus assured that the privations of my party, so long borne with patience, were at an end, and that one of the great objects of my journey, "to prove the possibility of reaching the West Coast by an available road," had been accomplished. We very

soon pitched our tent, and, seated before a cheerful fire, enjoyed once more a really hearty meal.

We were compelled by heavy rains to remain here for three days, and during the first night the river rose so high and so rapidly, as to compel us to shift our camp to higher ground, the water rushing into our very tents.

On the 21st of March the rain ceased a little, the river fell, and by tying bundles of flax sticks together on each side of the canoe in which the provisions had been brought up, we ventured down stream with the flood. We descended rapidly, although it required the most careful management from our four Maories to take us safely over the various falls. In about an hour we passed the camp of Mr. John Rochfort, the surveyor, and should have much liked to have shaken hands with him; but the rapidity of the stream would not admit of our landing, and we could, therefore, only shout our recognition.

A passing look at the coal seams exposed on the river bank, and the character of the shales and sandstone by which they were accompanied, convinced me at once that they were of a high geological age, and of an importance not yet fully understood. At twelve o'clock we passed through the last gorge, formed by a low limestone range, and heard with pleasure the roaring of the surf on the bar. We soon reached the Maori pah, where we were received by Mr. Mackay, and the assembled Maories, with every sign of welcome.

We remained at the pah for five days, during which time it was either raining, or the freshets prevented me from returning up the river with a canoe, exchanging thus our life in the wilderness for the noisy existence of a Maori pah. Instead of the soft murmur of the rivulet, the roaring of the larger streams, the rush of the wind through the tops of the high evergreen trees, forming as they did a splendid emerald roof over our heads, changeless and unfading, and the merry song and variegated notes of the fearless birds, which gave life to the wild scenes of untouched nature around us, we heard nothing but Maori songs and Maori noise from morning till night; insufficient, however (and this was our only consolation) to drown the majestic roaring of the surf as it flowed over the pebbly and sandy shores.

The Maori character must have recently undergone considerable change, for, instead of the hospitality described by a former explorer, they required payment for everything, not in pounds, *shillings*, and *pence*, which latter coins they entirely ignored, but in pounds only. During one day of my stay at the pah, I visited the lagoon on the southern bank of the Grey, near its mouth, which, though now the resort only of thousands of aquatic birds, will at some future time become an important part of its harbour. Another day was devoted to examining the cretaceous cliffs five miles north of the Grey, forming remarkably bold headlands.

The weather was at last settled, and the river fell considerably, so that we again thought of resuming our exploration. After having well considered my future proceedings, I found that we should be able to get on more rapidly by ascending the river in a canoe as far as the junction of the Mawhera-iti, and from thence, again shouldering our packs, to proceed straight across the country to the Upper Grey, where it enters the plains. By this means I should be enabled to examine more minutely the extent and nature of the level land in that district. At the same time I fixed upon a high mountain in the range bounding the district, which I determined to ascend, for purposes of observation. On my return from this expedition, I intended to examine the country through which the Otututu flows, then striking across from this river to the Mawhera-iti, and over the grass plains, to pass the saddle between that river and the Inangahua, a tributary of the Buller, and from thence, weather permitting, to the junction of both rivers.

It will be seen in the sequel that I succeeded in carrying out the greater part of my programme, notwithstanding the most horrid weather, and the almost continued freshes and inundations by which we were impeded. If, therefore, after having seen the Grey district under such unfavourable aspects, it still leaves an agreeable impression upon my mind, there can be little doubt that it is a really splendid country.

The storekeeper, who had arrived in the vessel which left provisions for us at the Buller, having nothing to detain him here, I sent him back, accompanied by a Maori guide, to the Buller, there to await our arrival. Mr. Mackay, also, who was going down the coast to purchase land from the natives, started at the same time that we did, and with him the whole native population of the district.

Having secured the services of another Maori, who, as a stranger, had nothing to do with the land question, and having hired a canoe from the chief Tarapuhi, we started on the 27th of March to pole up the river. There are several rapids to ascend, to pass which required all the strength and skill of the men, and occupied a considerable time; so that by the evening we had only proceeded a few miles, which, on our return during a heavy fresh, we passed over in about half an hour.

The next day brought rain again, but I was anxious to get on, and as we had to wade often breast high to drag the canoe up the stream, it did not matter much whether it was fine or not. In a few hours we arrived at the gorge in which the carboniferous strata are visible; here the river being too deep for our poles, we had to push the canoe forward by holding against the sides of the cliffs. We stopped for dinner at the slip in the gorge where the coals are exposed, and I cursorily examined them; but, being unable to devote much time to it, I could not form any fixed

opinion in reference to their age, although from the character of the coal itself, the few impressions I there found of the fossil flora, and the lithological character of the rocks (which resembled very much the rocks of the carboniferous period), I was satisfied that I had here to do with coal measures much older than any other hitherto seen or expected to be found in New Zealand. Towards evening we left the gorge behind us, and passed the Kotukuwakao stream, the outlet of the lake of the same name, commonly called Lake Brunner.

The valley of the Grey, bounded on its western side by the continuous range of the Paparoha chain, which stretched to the north as far as the eye could reach, and in which the rounded tops of the high granitic mountains contrasted strongly with the serrated, castle-like, and needle-shaped points of the gneiss and metamorphic schists behind them, widened very much, consisting partly of magnificent forest, containing different species of the pine, and partly of grass land. A large opening towards the north was visible, in which only low hills appeared here and there.

Towards the west and south-west the high rocky chains through which the Buller, the Inangahua, the Grey, and the Ahaura break, before entering the plains, gratified the eye by their varied forms. The river bed itself became very wide, the water being often divided into several channels, separated by extensive shingle beds, which are only covered during heavy freshes, and were the repository of large trees left behind by subsiding floods. So we proceeded for three days, toiling hard to propel the canoe, the drift trees frequently offering serious obstacles to our progress.

On the evening of the 30th of March, the rain set in again, and so heavily, that, as we were encamped on the low ground near the river, we feared it would rise so as to compel us to take to the trees. Fortunately, towards morning, notwithstanding it still continued to rain, it fell less heavily. As we were unable to proceed with the canoe, I struck a little inland, partly for the purpose of collecting botanical specimens, and partly to examine the nature of the soil.

On the 1st of April the river had fallen so much that we could pursue our journey, and during the day I had an opportunity of examining the first tributary of any size which flowed from the Paparoha chain, the boulders of which satisfied me, as indeed I had expected, that the coal formation extended at least so far towards the north.

We arrived next day at our old camp in the Ohine-taki-taki grass plains. During the whole of this time we had seen signs of Mr. Rochfort's progress in his surveys, frequently coming upon his ranging rods and the marks of his chain in the sand. He had also camped here, and evidently only started the same morning, his camp fire still burning.

On reaching the place at which we had left our tent, well pitched and secured round in order to protect the provisions, we found that it had disappeared, and in its place a very nice and well covered whata (provision store) erected by Mr. Rochfort's native labourers. In a note which he had left, he informed me "that he had observed that the rats and wekas had found their way into my tent, and that as it was not tight enough to protect the stores sufficiently from the rain, he had thought it proper to secure them by building the whata." It is scarcely necessary to say that I and my whole party felt very much gratified by this act of kindness.

Preparing everything for an early start next morning, I ascended the grassy terrace which forms the principal portion of the plains of the Ohine-taki-taki, which run several miles inland, and over which we walked in many directions, establishing a topographical station on their western side.

Several of my party, who had suffered very much during our stay at the pah, in consequence of the weakened state of their stomachs, had recovered, but I myself now began to feel the effects of our previous starvation. I felt great pain, and was unable to eat, or rather to keep anything on my stomach for several days; but by adhering to a low diet I soon recovered, and, like the rest of my party, again enjoyed my meals. Our canoe was very small, and in bad condition, so that it was impossible to remove everything at once to the junction of the Mawhera-iti, where I intended to establish my head-quarters; so we were compelled to leave some things behind, which had to be taken up on our second trip.

On the 4th of April we reached the Otututu, and saw Mr. Rochfort and his men surveying at a short distance from us: a strange but pleasant sight in this solitary country. We very soon came up with him, and our meeting was a hearty one on both sides. We continued together as far as the junction of the Mawhera-iti, where we intended to camp for a few days, and to build a substantial whata, to preserve our provisions from the rain and the rats.

The next day, during which all the men were occupied in felling trees, squaring timber, and collecting manuka bark for the whata, I explored, accompanied by Mr. Rochfort, the Mawhera-iti for two miles upwards, and we were gratified at finding level country and fertile soil up the valley of this river. When the whata was so far finished that Mr. Rochfort's party alone could complete it, I sent three of my men down to the Ohine-taki-taki to fetch up the remaining provisions.

Mr. Rochfort started up the river on the 7th of April, and as my canoe had not yet returned, I occupied myself (it being a fine clear day) in making a sketch of the country around us. Here, as well as everywhere else, during our journey, except in the

higher grounds, the sand-flies became very troublesome, and sketching, mapping, or writing, during the day time, was really a torture; but whether it was that my skin, by exposure day and night to the inclemency of the weather, had become insensible to this torment, I certainly could now write for hours with only the protection of a pocket handkerchief tied round my right hand, so as not to soil the paper with the blood drawn by these minute flying leeches.

In the evening my men returned, and we prepared everything to start the next day for the Upper Grey, and for the ascent of the mountain. I had selected this mountain, called by Mr. Mackay Black-hill, lying on the southern side of the Grey before it enters the plains, not only because it is situated in the middle of the eastern chain bounding the open country, but also because its round top and smooth sides seemed to be easy of access. Before starting, I had rather a stormy scene with the native whom I had engaged at the Mawhera pah, because I would not permit him to select his own load, but compelled him, as was fair, to take that which was determined to be his by lot. To this he would not submit, and seizing the paddles, he attempted to take the canoe, which did not belong to him, and return to the pah. It is scarcely necessary to assert that I objected strongly to his proceedings, and it was only after considerable time that I could bring him back to his duty. After having secured our canoe, we started up the river, taking ten days' provisions with us, and from time to time crossing and recrossing it in order to avail ourselves of the dry shingle beaches and grassy banks. In the evening we reached Mr. Rochfort's camp, and again enjoyed the pleasure of his company.

Having, during the last ten days, continually waded in the river, the water of which had become much colder (the autumn nights being already somewhat sharp), we became very stiff and sometimes cramped in the evening. During the night two of my men fell suddenly ill of dysentery, and it was only after two days' rest that they were sufficiently restored to continue the journey. This delay was disagreeable, because the weather was very fine, and we should otherwise probably have reached the mountain-top; but as I had intended, during my return, to examine the grassy terraces which lie on both sides of the river where it enters the plains, I took advantage of this delay to do so now, so that these two days were not altogether lost.

My two patients having at last so far recovered that we could start, we resumed our journey on the 11th of April, and it was not without pleasure that we followed our old track, remembering the sufferings we had undergone on our way down, three weeks before, and how anxiously we had looked for the junction of the Mawhera-iti. The two men being still, however, very weak, we made a short day's work, and pitched our tent on the northern

side of the river, at a spot from which I intended to strike across the country, instead of following the river further up. The river here takes a decided turn towards the south-east with a large bend, after which it turns to the north-east, so I determined to travel due east, and strike it near the foot of the Black-hill. Mr. Burnett, whilst I examined the geological character of the country, started with two hands to blaze and cut, where necessary, a line through the dense bush, so that we might get on more rapidly the next day.

In two days' march, during which we cut a good line for the use of future travellers without meeting with any difficulties, we again reached the banks of the Grey, a mile below the Alexander. Unfortunately it began to rain during the day. We therefore hastened across the river, and camped on high ground, the rapid fall of the aneroid indicating the approach of another spell of bad weather.

During this night, and the following two days and nights, we had incessantly heavy rain, which compelled us to keep to our tents; these from constant use, were daily becoming thinner, and offered therefore but a very incomplete and uncomfortable shelter. He who has not experienced it, can scarcely imagine the wretchedness of travelling through dense bush, everything soaked through by the rain, and then pitching a tent on wet ground, whilst the firewood is so damp that it can only be ignited and kept burning by dint of great perseverance and skilful exertion: the storm howling through the tops of the trees, the water pouring down in streams, and the neighbouring river, swollen to a torrent, tearing along its course as if its bed had become too narrow for it, added to the wretchedness of the scene around us. We could hear distinctly the rolling of the large boulders as they were carried along by the impetuous current, as well as the constant crash of large trees rolling over the rocks, borne by the flood towards the sea. The uproar of the elements was still more cheerless during the night, and the feeling of discomfort augmented when a part of the river bank fell into the torrent with a noise like thunder, whilst here and there the crash of dead branches made one fear for the safety of the tent. It was during those stormy nights that I first began to hear some of my party wish themselves back in Nelson, enjoying the pictured happiness of a comfortable room and a snug bed.

At last, on the 16th of April, the weather cleared up, the blue sky shone through the trees, and, notwithstanding the forest was still soaking wet, I started, accompanied by Mr. Burnett and one of the Maories, to find a spur leading up the mountain. As there were several distinct peaks, the great difficulty was to find a spur leading to the highest. The river here formed two terraces, broken through by numerous deep gullies caused by streams from the mountains, and although as we advanced we tried by every means

to get a glimpse of the summit, we were unable to do so, in consequence of the compact roof of foliage above our heads. After a great deal of climbing, we at length found a good spur, leading apparently in the right direction, which we ascended for about 800 to 1,000 feet, in order to satisfy ourselves of the fact. Finding that it did so, we blazed it for future use, and returned, of course wet to the skin, to our camp.

We started the next morning, the weather being still fine, and followed the spur, which continued to rise gently, with the exception of a few rocky points, and was covered with dense vegetation. At an altitude of 3,000 feet the forest ceased, and was succeeded by a sub-Alpine vegetation so dense that it is extremely difficult to give an accurate idea of it. Seeing that it was impossible to proceed with our loads, and having found a clear spring in the vicinity, I ordered the tents to be pitched; but as the sides of the mountain were here very steep, this could not be done until we had erected a kind of stage.

Mr. Burnett, myself, and one of my hands, in the meantime started to cut a line for our upward route, which, however, was more easily projected than done. It was necessary to cut every branch in our track, for as they grew downwards, they offered an almost impassable barrier; and, to do this, we were frequently compelled to climb over them, in order to reach their upper sides. We worked for three hours without intermission, and had then only ascended 300 feet. The sides of the mountain moreover became gradually steeper, and we were often obliged to climb round overhanging rocks.

After overcoming all these obstacles, however, we at last came to a more serious impediment to our progress, in the shape of a perpendicular granite wall, thirty feet high, which stretched away in both directions, and which, unfortunately, was so smooth that it seemed impossible to ascend it. Upon searching, however, we found a spot where, in crevices of the rock, some ranunculus plants had taken root, and which seemed to offer a prospect of foothold. Here we climbed up without boots or stockings, which we took off in order to have a better footing, and then found that there were no further obstacles to our reaching the summit.

As night was approaching, we descended to our camp, which we reached in a quarter of an hour, passing in that time over ground which had taken us nearly four hours to ascend. In the evening the Maories plaited a flax rope, for the purpose of drawing up our loads at the granite wall.

I started the next morning (April 18) with one tent, and provisions for two days, intending to camp on the top of the mountain. The weather again changed, and we were enveloped in dense clouds, which very soon wetted us through. After having passed the cliff, the road continued through sub-Alpine vegetation,

but not of so dense a character, so that we were enabled to ascend with less cutting. A few hundred feet higher up the mountain was strewed with gigantic rocks, only partly covered with grass and mosses, but here we found a big gully, which, although very steep and full of spear grass, enabled us to reach the top at eleven o'clock. The clouds still overhung the mountain, occasionally, however, opening sufficiently to give us a partial view of the sea of rocky peaks around us.

It was very trying, after having got so far, to be stopped, first by the illness of my companions, and then by bad weather, our provisions too diminishing so rapidly that I feared, if the bad weather continued, that I should have to return without obtaining any adequate result for our exertions.

Towards noon the clouds rose, and, to our dismay, we saw above us, separated by a valley at least 1,000 feet deep, the dome-shaped form of Black-hill. We had evidently missed the right spur, and ascended a mountain further to the south. We at once resumed our journey, and although the sides of the hill, which I named Deception-hill, were very steep and covered with scrub, we in a short time reached the saddle between the two mountains.

Here, seeing that there was no wood higher up, I left some of my party to pitch the tent, intending afterwards to return to the camp on the side of Deception-hill, and, proceeding with all possible speed, I reached the summit at two o'clock, accompanied by Mr. Burnett and one of my hands, finding, to our great satisfaction, running water all the way. The passing clouds still occasionally enveloped us, and the wind, blowing hard and cold, made our position very uncomfortable. But we were recompensed by a most extensive view, although the clouds covered the higher mountains. Towards the east and north, the large district of the Grey was lying like a map before us, and the river meandering through it was visible from the point where it enters the plains down to the gorge near its mouth. I could trace the Ahaura in its whole course to its junction; far away the blue waters of Lake Brunner, or Kotukuwakao, were visible, whilst between it and the Ahaura appeared another beautiful sheet of water several square miles in extent, which I named, in commemoration of the visit of my eminent friend Dr. Hochstetter to this province, Lake Hochstetter.

The level country was only interrupted here and there by ridges from 100 to 150 feet in height, partly covered with forest and partly with grass. The eye dwelt with pleasure on this extensive tract, in which, however, no sign of human presence was visible, except the smoke rising from Mr. Rochfort's camp in one of the grass plains, the colour of which contrasted agreeably with the dark green tints of the forests. The valleys of the Otututu and the Mawhera-iti and their streams were also visible.

Towards the north-north-west, the large valley of the Inangahua stretched away as far as the eye could reach, whilst on the northern side of the Buller low hills were visible between the eastern and western rocky chains.

Towards evening the weather cleared up, and as it became extremely cold, we lit a fire with the roots and short stems of a few Alpine scrubs, it being scarcely possible for me to keep the pencil between my fingers. It is difficult to describe the wild scenery towards the east, south, and north; peak after peak appeared, one towering above the other, and each surpassing the other in abruptness and fantastical outline. Towards the north-east was visible the break in the two parallel chains through which the Grey flows, over which again rose in all its majesty its vast snow-fields gilded by the setting sun, Mount Franklin, the parent source of all the streams the courses of which I could see; whilst towards the south-east lay the three snow-clad giants, Plinlimmon, Helvellyn, and Skiddaw, fully 2,000 feet higher than they are noted in the maps. We arrived at our camp at nightfall, and although it was very cold, and we had no proper firewood, we passed an excellent night.

Next morning we again ascended the mountain, and I hoped to have finished by noon, so that we might return to our camp on the side of Deception-hill, but unfortunately the weather had not yet cleared, and just at one spot towards the north, where I had important bearings to take, clouds obstinately remained, so with pencil in hand, chilly and cold, I stood waiting till the weather changed. At the time when we should have returned the clouds still hung over the mountains, but as the aneroid was rising fast, I determined to wait for sunset, when the clouds generally disappeared. We had only taken some damper with us for a scanty breakfast and dinner, so that we should have to go to bed without a meal, but my perseverance was recompensed, as towards the close of the evening the clouds rose, and the whole chain, in all its details, became visible. The night was so cold that we got no sleep, and I could hear my poor companions, who had only one blanket each, shivering with the cold.

In the morning, the water pools round our tent, and the tea in the billy, were hard frozen, and we were very soon on our way to rejoin our party, in order to warm ourselves and get a breakfast. Our road lay over Deception-hill; it was a magnificent morning, the sun shone brightly in an unclouded sky, and from the top of the mountain I obtained one of the finest views I ever remember to have seen. Over the whole low country floated a dense mist, giving to it the appearance of a large sea, above which the mountain chains rose like islands, so clear and distinct that the minutest details of their outlines were visible.

The highest summit ranges of the Island, commencing at Kaimatau, on the southern side of the Taramakau, and running from

thence to Milford Haven, well named the Southern Alps, were distinctly visible, and amongst them, its two snow covered peaks glittering in the sun, Mount Cook rose majestically. We could not sufficiently admire this unique scene, and it was not without regret that we commenced our descent from our lofty observatory. After a *hearty* meal *of lilipi!* our other provisions being exhausted, we descended the mountain, crossed the Grey, and camped on the other side, near the spot where the proposed line of road will enter the forest. Although we started early the next morning, we thought it almost impossible to reach our provisions at the junction of the Mawhera-iti, it having taken us three days to get from thence to our last night's camping place; but not having much to carry, we determined to try our utmost, and here we learnt the difference of travelling through untouched forest and through a blazed track with occasional cuttings. At eleven o'clock we reached our old camp in the bush, at three we struck the Grey, and at dark arrived at the junction, exhausted by hunger, wet, and cold, having forded the river, which was now very cold, at least ten times, thus accomplishing in one day our three former days' march. In fact it was only by walking as fast as we could that we succeeded in keeping up the circulation of the blood. This mountain trip thus occupied me a fortnight, whilst in fine summer weather it could have been accomplished in from five to six days at furthest.

The next day, 22nd April, we prepared to start in a northerly direction to examine the rivers Otututu and Mawhera-iti, although it began again to rain. For three days and three nights the rain continued without ceasing, so that it was impossible to move forward. The Grey and the Mawhera-iti rose very high, and it was really a beautiful sight to see these two rivers join, each bringing down enormous masses of timber uprooted by the flood. Having confidence in the large valley, and in the broad bed of the river, we thought our camp was quite safe, the banks of the Grey being here from twelve to fourteen feet above the level of the stream, but we were greatly deceived.

At day break on the 24th, on looking out of the tent, I observed, to my astonishment, that the water was already level with the river banks, and from the continued rain we had reason to expect a further rise. Of course I called out the men, stowed everything as quick as possible in the whata, and yet, before we had struck the tents, we were knee deep in water. We searched around us for a higher spot, but unfortunately without success, as the place upon which we had pitched our tent was nearly surrounded by a little rivulet in which the water was much deeper than where we stood. We all went to work, however, and erected upon the highest point of our island, between two trees, a stage, over which we spread the tent. Here, at least, we were safe, though it is not necessary to add that we were rather uncomfortable, having been

for the greatest part of the day wading in the cold water whilst the rain poured upon us from above. This was the heaviest inundation which the natives had ever experienced, half of the pah at the mouth of the Grey having been swept away by it. The next day the clouds began to break, and the weather cleared up again, and although the rivers were still very high, we were able to start on the 26th.

Instead of following the Grey down to the spot where the Otututu joins it, I thought it better to strike across the country, which, in consequence of the deep water courses, was very wet work. After two hours' walk, we emerged upon the grass plains which lie on the eastern bank of this fine stream. Notwithstanding it was still swollen, we managed to cross it several times in its lowest parts, in order to profit by the occasional shingle beaches; but higher up this was not possible, the river bed being narrower, so we were compelled to remain on the eastern side, and to find our way through the dense scrub which occasionally replaces the grass. This gave us not a little trouble and hard work, so that by the evening we had not advanced more than four miles, and camped on the grass near the river. The next morning again one of my men fell ill, which detained us another day.

To profit by this delay I started with another of the men up the river to examine its banks, wash for gold, and get a general outline of the country, whilst Mr. Burnett went to search for a road through the belt of interwoven scrub which surrounded us, over which, towards the east, two small grassy terraces were visible, these again bounded by forests. Returning towards evening we found our patient much better, and could therefore start the following day for the Mawhera-iti, on the line blazed by Mr. Burnett. We struck the river four miles north of its junction with the Grey, where a large grass flat lies on the eastern side.

The banks of the Mawhera-iti for the next three miles were covered with small grass patches, from one-eighth to half a mile broad, beyond which again large terraces appear, partly covered with splendid grass, partly with toitoi, Taranaki fern, and stunted manuka. These terraces reach to the Paparoha range, three to four miles distant, and would therefore form a good run for sheep or cattle but for the boggy grounds between. We crossed several very nice mountain streams falling into the main river, on the banks of the second of which we camped.

The next morning, the 30th April, we ascended the terrace, which afforded better walking, as the lower ground was very much intersected by little swampy rivulets. We soon struck Mr. Rochfort's line, and this sign of approaching civilization was very pleasant. We hoped that Mr. Rochfort was far ahead of us, as we should be able to travel much faster along the good line he had

cut. After several miles' walk over swampy grounds, once covered with dense forest, as was proved by the presence in them of numerous stumps of large burnt trees, we found the river turn towards the north-west. Another small branch, flowing from the north, had been followed by Mr. Rochfort, leading him into a dense forest, composed of different species of the pine family. Towards evening we came up with him, a few miles from the saddle, and we had once more the pleasure of camping together. Here his line ceased, and we had to continue our own route, following one of the branches towards the north-east. We camped at the foot of the small ridge forming the watershed of the Buller and Grey, intending to cross it early next morning, and reach the Inangahua in the middle of the day. But we were cruelly deceived; heavy rain set in again, and lasted from the evening of the 1st May, to the morning of the 6th.

I shall not attempt to describe our feelings of annoyance at being again kept in the tent, unable to move, our provisions diminishing rapidly, and what was most tiresome, the probability of being compelled to return without having reached the Inangahua. Even when the rain ceased for half an hour it was impossible to move, on account of the deep saturated moss under foot, the wet bushes, and the dripping of the trees above, which very soon wet us through and through.

I employed this time, having fortunately a change of clothes, very much patched and worn it is true, in collecting botanical specimens, working at my sketches, and painting the fungi collected in our neighbourhood. We all, believing that the winter season was always the same here, thought the climate of the West Coast most horrid, and I could not but concur with one of my party, who proposed to change its name to *Wet Coast*.

After three days' idleness I could no longer stand it, and proposed therefore to Mr. Burnett that, notwithstanding the rain continued to pour down in torrents, we should start together and ascend the saddle, in order to examine it. This we did, and it was a very wet business.

Fortunately, when we reached the saddle the clouds, as if to recompense us for our trouble, opened for a short time, and we could see the large valley of the Inangahua at our feet. We had only a little flour left, so when, on the 6th May, the rain ceased, we began to retrace our steps, and after a few hours' walk arrived at a spot where, a week ago, we had camped with Mr. Rochfort. We found him still there, as he had not been able to move, and although his stock of provisions was not very great, he willingly shared it with us. In the evening we camped near one of the large streams coming from the Paparoha chain, about twelve miles distant from the junction of the Mawhera-iti.

Our misadventures, however, were not yet over. During this night and the following day we had nothing but rain, hail storms,

and tempests, so violent in fact that we had great difficulty in securing our tent, which we feared every moment would be blown to pieces. The river near our tent became a torrent, and although the rain ceased during the night, we did not conceive it possible to continue our journey next day. This we did, however, although it was not without considerable difficulty that we crossed the river and the many smaller streams, which, like torrents, rushed down from the mountains. We arrived at last at the Mawhera-iti, which we had to cross; for a moment we stopped, and looked at the dirty swollen river before us, but as it again began to rain slightly I was determined to try and get over. In order to do this, we availed ourselves of an old Maori plan, by which they cross deep and rapid streams, and which was the only one that would enable us to make a way through the rushing waters. Instead of crossing over one by one with a stick, we took a long stick, upon which everyone placed both his hands, and then, entering the water at the place where we knew that the ford had been, we kept in one line with the river. The advantage of this method was very great, because the force of the dashing waters, instead of having to be surmounted by each, was more easily overcome by five, whilst the rolling stones carried against the feet, or which move when the feet are placed upon them, will often cause a single man to lose his footing, whilst in this manner they do no harm, as each protects the other from falling. But notwithstanding these advantages, it was not without the greatest exertions that we forded the river. At one place, where a small arm of the river had to be crossed, one of the Maories, a capital forder, tried to go alone, but although the water was not much above his knees he was washed down, and it was only by great exertions that he saved himself.

Two miles below the junction we had still two fords to cross; entering the water at the first of these it very soon reached our arm-pits, and we should have lost our footing had we attempted to proceed. We were therefore obliged to turn round and get back again, which, as will be easily understood, we only accomplished with the greatest difficulty. We then travelled through dense scrub for half a mile, after which we reached open bush, where we made better head way. It was nearly dark when we arrived at our old camp at the junction, where we enjoyed a good meal, and slept soundly after our day's exertion and the wet and cold we had suffered.

On the next day (the 9th of May) the weather cleared up. The Grey was still very high, but having already lost so much time I determined, after a short consultation with the natives, to start. It was twelve o'clock when we entered the canoe on our way down. We took the centre of the river, the rapid flow of which could best be appreciated by observing how quickly we passed the various jutting points. Keeping in the centre of the stream, we

had not much to fear from drift trees, often of enormous size, which everywhere were lying in the shallower places near its edges. Three miles below the Otututu, where the river makes a sharp bend towards the west, turning again after another half-mile towards the east, we found its bed much changed, the great flood having formed a new channel, through which the main river flowed, and towards which the current took our frail canoe. This was a moment of great anxiety and excitement. The river bed was here very narrow; all before and around us were breakers formed by the rushing of the torrent over snags, which encumbered the river in every direction. We travelled at the rate of ten miles an hour at the least, and all the skill and energy of the Maories were required to guide the canoe safely through: not a word was spoken, everyone looked before him, expecting each moment that the canoe would be dashed to pieces against a tree. After a few minutes' suspense we again entered the broad current, having happily passed the most dangerous spot. We stopped an hour at the junction of the Ahaura, in order to make a sketch and take some bearings, and arrived at six o'clock in the evening at the mouth of the river. But we looked in vain for some of the whares. They were gone, and amidst the ruins, like Jeremiah amongst those of Jerusalem, stood Katarina, one of the two Maori women who had been left behind, singing a most doleful waiata, in which she described the flood, and its destructive effects, finishing with the words "Awe, awe, kua riro te mira," (Alas, alas, the mill is lost), which she considered the greatest misfortune they could sustain.

Not being able to re-ascend the river on account of the flood, I stayed at the pah for six days, during which Mr. Mackay, with the greater part of the Maories, returned, and again noise and bustle began to reign. When the river had fallen sufficiently to enable me to re-ascend it for the purpose of making a minute examination of the coal-field, it began to rain, which caused a fresh delay. It will be observed, that since we left the Grey I have no longer detailed the results of our bird and eel-catching efforts, but as several explorers before me have given minute accounts concerning the additions to their daily bill of fare derived from these sources, I think it scarcely necessary to refer more fully to this portion of our bush life than to say, that we all acquired great skill and experience in catching eels and snaring wekas, and that with pleasure we added the booty, as a welcome change, to our stock of provisions.

During our stay at the pah some of our party suffered from lumbago, but not so seriously as to prevent us from thinking of starting. Richard Kemp, the native, however, got such a swollen leg from rheumatism, that I was obliged to leave him behind, and old Puaha, Mr. Mackay's native, went with us instead. The river had at last fallen sufficiently to enable us to start, and after a pull of a day and a-half we reached the coal-measures.

From the 17th to the 28th of May I was occupied in examining this most important district. After having followed the different ferruginous sandstones, clays, and grindstones, which occur in regular succession, I found, below the underlying grits, the first small seams of coal, the examination of which completed my first day's work.

The next morning, continuing in a systematic way, I soon had the pleasure of discovering the main seam, which I followed up to the bed of a small rivulet, where it was lying exposed to a depth of twelve feet six inches. I must confess that I was much excited, because, on examining the coal *in situ*, it was clear to me that I had to do with a *real coal*, its compactness, specific gravity, lustre, and combustibility, leaving nothing to be desired. As the seam struck in a regular way across the river, whilst at the same time I was able to trace it towards the north, I had no difficulty in concluding that the spot upon which I was standing would prove a source of great wealth, not only to this district, but to the colony at large. In a few years, I said to myself, instead of the wilderness, we shall have the dwellings of men; instead of a few birds, now its only inhabitants, we shall have a busy population of miners enlivening the country; the shriek of the locomotive will resound through its valleys, and busy life and animation will everywhere be seen. The harbour will be the resort of numerous colliers, and an active population will replace the inert savages who now occupy the pah. The Grey district, possessing easy communication with other parts of the colony, will, I hope, soon be peopled, and its farmers find their market amongst a mining population. I may be pardoned if, instead of reporting mere fact, I have here given way to my feelings, but I conceive that the most matter-of-fact man would become imaginative when standing upon a spot containing such a vast store of mineral wealth.

In order more fully to examine these valuable deposits, I ordered the tents to be pitched, and determined to lay the whole seam open. As Mr. Mackay intended to start, however, the next day, and required Puaha's services, I sent Mr. Burnett down to engage another Maori in case Dick should not have recovered.

Mr. Burnett left next morning, and we, in order to get at the floor of the coal seam, began to dig a ditch. By this means we opened the seam to a depth of fifteen feet; we did not succeed in reaching the floor, the water of the little streamlet being very troublesome, and filling the hole as fast as we dug it out. I could see too that along the southern side of the river the whole seam was lying exposed, so after another day's work at the ditch we left off, and I continued my examination. I had not yet found any fossils, and therefore devoted the next two days to a search amongst the almost vertical cliffs which here form the southern side of the

river. Assisted by one of my European companions, I fortunately obtained a rich collection of the fossil fauna in the overlying rocks. It was raining during the whole time, but having found a spot where some projecting rocks gave us shelter, we continued to work during the whole day, and returned to camp with our treasures in the evening.

The 22nd of May I continued my researches, following the river upwards, which, owing to the very broken nature of the country, was rather a difficult task. I this day discovered two other seams of coal, lying below the main seam, one one foot, and the other four feet six inches thick. It was not without great difficulty that I reduced to order the various strata of this important coal formation, for the whole side of the mountain here consisted of broken pieces of shale and grits, lying about in all directions, often in large blocks, intermingled with coal. Having traced the lowest visible seam, I began to dig a pit, in order to ascertain its thickness. After having cut into the seam more than twelve feet, and still finding good coal, I heard it begin to crack above us. I therefore ordered the men at once to come out of the pit, and we ascended the hill to clear away the many loose rocks lying above the seat of our work. The men had not been five minutes out of the pit when a large block, at least half a ton in weight, fell into it. I thanked Providence that I had insisted upon their leaving the hole, although they themselves would not believe there was any danger.

During this day I collected a great quantity of shale, with very perfect and variegated impressions of leaves of fern and plants. Another day was devoted to following up one of the rivulets, which, about half a mile above, formed a magnificent cascade over an overhanging cliff at least forty feet high, and I waited impatiently for the return of the canoe to go over to the southern side of the river. It returned late in the evening, having come up from the pah in one day.

Notwithstanding the rain began to pour down in streams, I crossed on the following day to the southern bank, traced the main seam there on two sides, and having again re-crossed the river, met it on the eastern side of the range, and thus fulfilled this part of my mission. As we had had the pleasure of seeing heavy freshes at two different places in the open country, it was only fair that we should also enjoy the same beautiful sight in the gorge.

During three days the rain fell without intermission, keeping us in the tents; but, having personally plenty to do, I did not so much suffer by it. By the meteorological tables attached to this report it will be seen how many wet days we had during this month, and from this it will be understood what discomfort we underwent in the dank black birch forest. Fortunately, at the coal field we kept up such a large coal fire that even the heaviest

showers could not extinguish it, and the tents dried as fast as they became wet.

Mr. Rochfort having finished his survey at the Inangahua this day, came down the river; but, as he was not able to land, we could only greet each other with a few words *en passant*.

Behind the spot where we were camped rose a hill from 800 to 1,000 feet high, separated from the main chain by a deep valley. Although the rocky cliffs satisfied me that it would be rather troublesome to ascend, we started, on the morning of the 28th of May, to reach the top, which was not accomplished without considerable difficulty, as in many places we had to climb up very steep walls.

The weather was still cloudy, but I got a complete bird's-eye view of the surrounding country, and of the level tract of forest which stretches between Lake Hochstetter and Lake Brunner. Having ascertained that the coal-bearing strata continued without disturbance in the direction of our day's march, and the rain again pouring down, I resolved to return to the pah instead of going, as I had previously intended, to Lake Brunner; for not only were our provisions partly spoiled, but it would have been impossible to reach the eastern bank of the Kotuku-wakaho stream, up which we should have had to go. We therefore, for the third time, went down the river in a fresh, and were again, by continued rain, detained at the pah till the 31st of May, when at last the weather cleared up and enabled us to say farewell to the Grey, and to start round the coast for the mouth of the Buller.

We crossed the river on the 1st of June, and had a most magnificent view of the Southern Alps, the majestic appearance of which it is difficult to describe. From Kaimatau, on the southern bank of the Taramakau, the whole chain was visible; but above them all rose Mount Cook, named by the natives the Ahoa-rangi (Piercer of the clouds of Heaven), dressed as low as we could see in a garment of dazzling snow, and standing in bold relief against the blue sky. Further to the south, like ice-islands rising above the sharp line of the horizon, appeared the points of two other peaks, the whole illumined by a brilliant winter sun.

It was with regret that we turned our backs upon this splendid scene, and continued our way towards Komatiki-tawao, a bold headland of cretaceous cliffs, over which we had to pass. After half an hour's walk through bush, consisting of kie-kie, fern-trees, and nikau palms, we again took to the beach. There another splendid view lay before us towards the north; the Paparoha mountain chain reaching to the sea shore, and forming perpendicular cliffs, upon which, as well as upon numerous picturesque islands close to them, the sea was beating with fury, whilst just above the horizon appeared the low hills of the Miko.

This view reminded me of some of the coast between Genoa

and Nizza, celebrated for its beauty, and to which alone it can be compared. Here we camped near the beach, which, being strewed with driftwood, gave us an opportunity of having a large and comfortable fire.

It was delightful on going out of the tents in the morning to see before us the deep blue sea with its restless waves, whilst above us the sun shone in a clear open sky. How pleasant this was can only be understood by those who, like myself, had for some time lived in the darkness of the forest. Here, too, we had a change of food, having found on the shore abundance of fish left by the receding tide, which were fresh and very palatable. We all enjoyed this change exceedingly. I here devoted a day to a close examination of the rocks around us, and collected many interesting and important fossils.

Having crossed, on the following day (June 3), the Wai-matukiri, we arrived at some perpendicular cliffs, formed by rocks belonging to the carboniferous formation, over which many little streamlets fell in pretty cascades. We crossed the Kaitorepi, and, after a few miles' walk, arrived at the Wai-aniwhenua, a beautiful mountain stream. This I ascended for a mile, accompanied by Tarapuhi, the native chief, and having convinced myself, by an examination of the rocks, &c., that the coal formation extended to this river, we rejoined our men, and in the evening arrived at the old Maori pah (Kararoa), where we camped.

It being high water in the morning, we had to wait for the reflux of the tide before we could pass round the next cape, and I profited by this otherwise unpleasant delay to return about a mile on our yesterday's track, in order to examine more minutely the rocks passed at dusk.

Having wished good-bye to Tarapuhi, who returned to the Grey from this, we continued our journey along steep cliffs and over boulders, between which, here and there, we found small sandy beaches. Beyond the Maukurinui, a bold headland composed of compact sandstone, the mountains receded from the coast, leaving at their base a small strip of level land about eight or nine miles in length, at the southern extremity of which we camped.

Continuing our route the next day along this sandy beach, we obtained a very nice view over the low cretaceous hills which bound it towards the east and south, above which appeared the rugged peaks of the central chain in the Paparoha range, whose forms contrasted singularly with the round-topped granitic mountains in front of them. The above-mentioned strip of level land is for the greatest part very swampy, and intersected by numerous little streams flowing from the mountain chain, amongst which the Kokiwi and Waiwero are the most important. At some places along the beach the shore resembled a large river bed, the

water oozing in a succession of streamlets from under the high banks.

The surprising abundance of running water which I observed during our inland journey continued undiminished round the coast, and it sometimes puzzled me how so much water could flow from so comparatively small a mountain range.

In the evening we arrived at the end of the sandy beach, and here again I observed cretaceous rocks, forming a most picturesque headland, partly undermined by the action of the waves. As it was impossible to get round these rocks (called by the natives Punakai-ki), we had to ascend them, which we did on the following morning. This point has been described by former explorers as presenting a frightful appearance; but although on the one side there is a deep chasm in the rock, whilst on the other the hill slopes down at an angle of sixty to seventy degrees, and the ridge is so narrow as to leave barely space for a footing, the whole is covered with flax bushes, which enable you to pass over without serious difficulty. Here one of my party felt so giddy that he could not proceed without assistance, and I had to go back and help him over. On arriving at the northern end of these cliffs we were again compelled to wait for the reflux of the tide, as we had to cross the Porarari. In the limestone rocks around us were several very nice caves, which we explored. Their summits, too, were covered with superb vegetation, amongst which the nikau palm stretched its graceful crown, and the sea dashing against the foot of the cliffs gave to the whole landscape a most romantic aspect.

It was two o'clock when we passed the Porarari, a stream of considerable size, and only fordable at the bar at low water, across which it is necessary to run as quickly as possible, in order to avoid being caught by the returning wave. The road from thence continues over steep cliffs, through an interwoven tissue of kie-kie and supplejacks, and although each of us cut as much as possible in the way, we found it very difficult to get through. After travelling about a mile through this tangled bush, we descended to the beach by a steep path, which presented distinct marks of the former action of the waves. Huge blocks of limestone and greensand lie one above the other, and apparently so loose as to lead to the impression that they would fall upon the least touch.

The next morning, passing over similar rocky ground, we reached and crossed the Punangahaire, a stream of considerable size, and arrived at the foot of some cliffs, which we ascended, travelling through three miles of bush, in which numberless fallen trees and a very dense vegetation gave us much trouble, and arrived at the famous cliff of the Miko. As this cliff is not merely perpendicular, but in some places overhangs, the Maories have constructed two ladders, one fifteen feet, and the other thirty-

one feet in length, and consisting of pieces of rata lashed together with flax, the steps being placed at irregular intervals. Between these two ladders is a little platform. As we descended, several of the steps, which were rotten, broke under our weight; but as Mr. Mackay had been kind enough some time before to replace the old flax rope by a new one, we had secure hand-hold.

The same man of my party who had already felt giddy at the former cliffs remained behind, and when the others had reached the foot of the ladder they told me that it would be impossible to bring him down. I, however, re-ascended, and after a considerable loss of time, succeeded in assisting him down to the first platform. As the second and longest ladder is lashed to a tree which grows in a crevice in the rocks, rendering it necessary to lean over in order to reach the ladder, it was here that I experienced the greatest difficulty in getting him down, his giddiness endangering not merely his own life, but also the lives of those who assisted him. I must confess that it was a moment of anxiety for us all, and we felt greatly relieved when we got him safely down.

I do not relate this incident for the purpose of giving interest to my narrative, or to show the dangers of travelling round this rugged coast, but merely to warn persons who have not steady heads and sure footing against attempting this route. The man I refer to is a first rate traveller, a keen river crosser, and in every other respect a good bushman, but he is giddy, which perhaps he himself had not previously known, and this would be a very great drawback to passing round the coast.

After travelling another mile, we arrived at the granitic rocks, and finding a nice little sandy beach before us, camped.

The next day, June 8, the coast becoming very rocky, we exchanged our boots for Maori sandals (pereiras), which allowed a better foothold on the smooth boulders. The coast consists of rocky promontories, with masses of huge granitic boulders between, over which the traveller has to find his way by a succession of climbings and jumps, and where a fall would be of the most serious consequence. In going over one of these promontories, whilst I was looking at some crystals in the magnificent porphyritic granite which forms these wild spots, I had not observed a narrow chasm, overgrown with grass and tutu, which lay before me, and in a moment I fell, my right leg sinking into the crevice up to my hip. The fall was so heavy that the glass of one of the aneroids was smashed to pieces, and the pivot upon which the needle turns was broken in two. My first impression was that my leg was broken, as I felt very great pain, and was unable to move; but after a short time I extricated myself, although the intense pain I suffered almost made me faint. In my foot, which had not been so well protected by the pereiras as

it would have been by thick boots, I had strained a sinew, which for a time completely paralyzed it. It was therefore a heavy task for me, with only one sound foot, to continue this kind of walking for half a mile further, until we reached a small sandy beach, at which we camped in the middle of the day; but, by using strong lotions, I was able, although obliged to limp, to resume my journey the next day.

The ground over which we travelled continued to be of the same description for about four miles; the view was most romantic, the sea dashing furiously against the granitic cliffs before us, whilst picturesque rocks, rising out of the foaming surf in all possible forms and shapes, gave infinite variety to the scene. Cretaceous cliffs overlying the granite again appeared, bounding the sandy beaches with vertical walls, over which numberless streamlets fell in beautiful cascades. These beaches afforded us better walking; but they were succeeded by the high cliffs called Maungahura, over which we had to pass with the aid of supple-jack ropes, as they jutted so far into the sea as to prevent our going round them.

Towards evening it rained heavily, and the Maori, who knew the road, told us that we had still two miles further to travel before we could reach a cave at which we intended to camp. It was nearly high water when we again reached the shore, and as the wind had risen considerably, the sea dashed furiously against the huge masses of limestone rock, between which we had to find our way. Here one of my party, in trying to creep between the rocks during the recession of the waves, was caught, and was kept sometime under water; indeed, it was not without difficulty that he avoided being taken into the sea by the surf. Another man, under whose feet the wet ground gave way as he was ascending a cliff, slipped over the precipice, but fortunately grasped some branches above him; his heavy load would have dragged him down, had I not heard his cries and gone to his assistance. We were all very glad when we arrived at the cave, and were enabled to camp in a dry spot, and, although we found it very draughty, we spent a comfortable night.

As I had some geological work to do, we stopped here the next day, and I went back over our last day's journey. Finding at low water a nice sandy beach, I was not long in reaching our descent of the previous day, and as the sun shone brightly it presented quite a different aspect. I learnt too that at many points of this coast the nature of the journey depends on the state of the tide, so that a part of the line which may have been described by one explorer as most frightful, because he had travelled over it at high water, would be found by the next to be perfectly easy, because he had crossed it at low water; though of course there are many places difficult of access, and which can only be passed at low water.

On the 11th of June we started from the cave, called by the natives Te-ana-o Matuku, respecting which they tell a very interesting tale of a large ngarara, a monster in the form of an enormous lizard, which formerly lived here, and devoured all who attempted to pass. Since they have become Christians, however, they have called it by another name, Te whare Taipo (the Devil's house), probably referring the formation of the cave, of which I shall speak more fully in the geological part of my report, to supernatural agency rather than to the hand of nature.

After another mile's walk we again left the limestone cliffs, which receded from the coast, and were succeeded by precipitous granite walls, here and there intersected by sandy beaches. The road here leads to the Tuhinu, a hill covered with rushes, mosses, and stunted manuka, at which point it leaves the coast and strikes inland. Ascending this hill, we had, as it was a clear sunny day, a superb view over the whole mountain chain north of the Grey, the beauty of the panorama much heightened by the appearance of the Southern Alps in all their glory, high above the sea horizon. The road follows the ridge, and after having travelled four miles, partly through dense bush, we had, on re-entering the open ground, an extensive view of the Paparoha chain. This mountain range, running almost parallel with the coast between the Buller and the Grey, here attains its highest altitude, the centre of the chain consisting of high serrated peaks, with deep ravines and precipices between, whilst in the front lie the rounded forms of the granitic mountains. It is also from this point that the traveller obtains the first view of the extensive tract of level land south of the Buller, and of the coast stretching far away to Taura te Weka, or Rocky Point.

We camped in a large plain, which was partly swampy, and started early the next morning, notwithstanding heavy rain had set in, hoping by the next day to reach the mouth of the Buller, our provisions, with the exception of a few handfuls of flour, being exhausted. At the northern extremity of the Tuhinu downs the granite again crops out through the post pliocene formation, through which many little streams fall towards the Wai-takere river, which we reached at noon. This is a fine stream, but being too deep to ford near its mouth, we crossed it about two miles up, and after scrambling for some time through thick forest, returned to the sea shore. Another half a mile of climbing over huge granitic rocks brought us to a long sandy beach, stretching away to Tauranga Point. The country now became very low, and instead of rocks, the banks of the sea consisted of hillocks of drift sand. We continued our route along this beach, but on arriving, after three miles' walk, at the mouth of the River Totara, the tide had risen so much that we could not cross it, and were therefore compelled to wait until the evening, endeavouring in the meantime to shoot some toreas (redbills), in order to add a little to our

small stock of provisions. As the water in the neighbourhood was very brackish, we suffered a good deal from thirst, but by starting at nine o'clock at night, crossing by starlight the rivers Totara and Okari, we reached the shores of the little harbour of Tauranga at twelve o'clock. There we found some fresh water, which was not a little comfort to us, and we all felt that we would rather be one day without a meal, as we had been, than seventeen hours without a drink, our thirst, too, having been increased by eating paste made with brackish water at the Totara.

On the next morning, the 13th June, we enjoyed very much the view across the pretty boat harbour of Tauranga, and were soon on our way to the Buller, which we hoped to reach in the afternoon. The coast again became rocky, granitic and metamorphic rocks forming bold cliffs, round or over which the traveller has to climb, and outside of which stand the high cliffs called the Three Steeples, breaking the line of the quiet sea horizon. Beyond Cape Foulwind limestone again appears, but a long sandy beach enabled us to travel with ease to Omau Point. Here I obtained a complete view towards the north, a view which the most indolent traveller could not but admire. The coast, at first retiring towards the north-east for about fifty miles, then turns towards the north-west for the next forty, forming a very extensive bay. Far away lay Rocky Point, the most westerly promontory of that part of the Island, between which and the point where we stood numerous picturesque headlands projected into the sea. Above these appeared higher hills, whilst behind them all, clad with dazzling snow, towered the great mountain chain which forms the back bone of the Island, and in the recesses of which the Aorere, Takaka, Wangapeka, Matiri, Karamea, and other rivers take their rise.

From this point a long sandy beach begins, forming the seaward boundary of the Buller delta. Over this we hurried towards the mouth of the river, which we reached in the evening. The storekeeper, whom I had sent forward from the Grey, hearing the report of our gun, came across the Buller lagoon, which stretches towards the south, and we were soon comfortably lodged in the substantial whare which he had built, and thus, after an interval of more than five months, we again slept under a roof, and enjoyed the conveniences of a table and chair. I had hoped to find a canoe ready to ascend the river, having made arrangements for that purpose with the native Livai, whom I had seen at the Grey, and who promised me that he would do all that was necessary to enable me to start immediately after my arrival, which I was anxious to do without delay. I was therefore much disappointed at finding that he had not done so, and, moreover, that he was not willing to do it, raising so many difficulties concerning the season, the freshes, &c., that I saw I should not succeed with him. The Canterbury diggers, who had come at the wrong season, having

returned to Nelson, had given their punt and canoe to our storekeeper, who placed the last at my disposal. The natives, however, declared that it would be quite impossible to go up the river with this canoe, which was heavy and ill chopped, and I therefore changed my plan, and instead of going up the Buller to the Inangahua, where I intended to have ascended a mountain, I thought it just as well to ascend the mountain chain north of the Buller, and to descend thence by the valley of the Orikaka to the Buller, striking it near the junction of the Inangahua, in case I could not otherwise obtain sufficient knowledge of the physical geography and geology of the surrounding country. In order to obtain a section of the chain at the point where the Buller pierces it, I intended to ascend the river for ten miles in the Goldseeker, the name given by the Canterbury diggers to their canoe.

After a few days' rest, during which the necessary preparations were made, and washing, mending, and other household occupations were gone through, we started on the 18th June to ascend the river. One of my natives being ill, I was compelled to secure the services of one of the few Maories who were living here, and I again learnt that, generally speaking, Europeans can much better bear fatigue and privations than the Maories of the present generation.

The Buller, or Kawatiri, near its mouth, and for several miles up, is a very fine and large river. For three miles the influence of the tide is felt, and we therefore started so as to profit by it. Where the tide was no longer sensible, the river became more rapid, and we had several ugly places to ascend. The Maori endeavoured to persuade me to return, asserting that we could not get any further, but of course I did not yield to his remonstrances.

The country on the banks of the river is flat, and covered with luxuriant forest, in which we camped the first night. The next day we arrived at a gorge where the river leaves the mountain range. This gorge, for the first mile, was singularly free from rapids, although the river was swift, and in some places very deep. The change of scene from the open country to the gorge was very striking, steep hills and rocky walls bounding the river on both sides, whilst small waterfalls rushed down here and there, the silvery hues of which were bordered by dark black-birch forest, and gave animation to the otherwise gloomy scenery. In the next mile large granitic masses occasionally narrowed the river bed, along which the water rushed with fury. Here our difficulties commenced, and we only succeeded in passing several of the rapids by dint of great exertion, the canoe being extremely broad in its bow. It was evening when we arrived at the Ohika-iti, a pretty river flowing from the southern chain, up which I travelled for a short distance, and found at its head a bold rugged mountain. The native told me that above the junction some very long rapids occurred, and that it would be perfectly impossible to go any

further, so, as I had seen enough of the country for my purposes, we returned to the mouth of the Buller the next morning, reaching it after a pull of about three hours.

We at once prepared everything for a longer trip over the Papahaua chain, towards the Orikaka, a tributary of the Buller, flowing from the north, and joining the main river nearly opposite the Inangahua. As we had to take three weeks' provisions with us, I engaged two other Maories to assist as far as the top of the mountain, from thence they would return, and we took tools to build a canoe, in case I should find it necessary to go as far as the Buller by the Orikaka. Everything was ready by the evening of the 21st of June, and we intended to start the next morning, but we had not yet come to the end of our trials. The rain again set in with storms of wind and hail, and lasted without intermission till the evening of the 30th June. Although we had a good roof above us, and were more comfortable in the whare than we should have been in a tent, we began to feel very impatient of the delay. We had expected to be only five months absent from Nelson, and we were then near the sixth month, without knowing how much longer our expedition would last.

On the morning of the 1st of July the weather cleared, the aneroid rose rapidly, blue sky was visible, and, for the first time, we saw the mountain chain covered with snow, giving to the whole landscape a perfectly new appearance. We at once started, and crossing the Oruaiti and Tititara, two small rivers flowing from the Papahaua chain, we reached, towards evening, the mouth of the Whareatea, where we camped, having travelled with comparative ease, though heavily laden, over a good sandy beach, from whence we had to strike inland towards the mountains. The night was very cold, the water froze in our billies, and just as we were about to start in the morning, one of the natives declared that he was again suffering from rheumatism. This was very disagreeable, but as it could not be helped, and I did not wish to be hindered, I divided his load between us, and sent him back to the Buller. After having travelled a mile through dense bush, skirting the sea shore, we arrived at an open tract of swampy land, a *paki*, as the natives call it, covered with rushes, swamp grasses, and, in the higher parts, with manuka and ferns, and over which, owing to the very heavy rains, we found the walking very fatiguing. The view over this tract of land, dotted as it was here and there with small groves of kahikatea, and terminating in the Papahaua chain covered with snow, was very picturesque; several deep streams run through it, across one of which we found, still lying, the trees thrown by Mr. Rochfort when he passed through last year. One of the Maories passed over first, one of the Europeans followed, but the trees being rotten, broke, and he was plunged into the water up to his chin. It took us some time to construct a new bridge, and it was evening when we reached the mountain, which

we ascended for 1,500 feet before we found a suitable place to camp. We continued the ascent the next morning, which, with our heavy loads, was rather tedious work. After having ascended another 500 feet, we left the black-birch forest behind us, and rata and sub-Alpine plants began to clothe the sides of the mountain. We soon reached the snow line, the snow itself lying on the more shady spots in patches. The weather then suddenly changed, and it began to snow, so that we were obliged to camp at the first fit spot we could find, which was about 700 feet below the summit. The following day was cloudy and showery, and the two natives from the Buller complained much of the cold, and told me they should return; I could not prevent them doing so had I been inclined, and they accordingly left me. I was annoyed at this, as they had themselves ascended the mountain last year, and had promised to point out to me from the summit some important features in the geography of the district. The native whom I had engaged at the Grey, under pretence that I had scolded him too much because he would not rise like the rest of us, also left, preferring the fire-side in the whare at the Buller to our life in the bush. After they had left, my party consisted only of five Europeans.

On the following day, accompanied by Mr. Burnett and one of the men, I started for the summit, wading through the deep snow which covered the slopes of the mountain. Notwithstanding the weather began to clear during the day, it did not do so as rapidly as I could have desired, for, from what I saw of the panorama around, I was satisfied that I could not have selected a better spot for a topographical station, the eastern side of the mountain presenting precipices from 600 to 1,000 feet high, which enabled me to obtain clear open views in that direction. Whilst ascending, I had observed that the rocks resembled the grits of the Grey, and on the top I found shales and conglomerates, which led me to believe that I was again in a coal-bearing formation, and my ideas were confirmed on examining a quantity of rocks collected by one of the men, whom I had sent down a gully near our camp for that purpose. Amongst the shales which he brought up I found impressions of calamites, and leaves of dycotyledonous plants, similar to those observed in the coal measures of the Grey. The weather again became fine, and the nights cold, the thermometer falling six to eight degrees below freezing point.

On the 5th July I again ascended the mountain; there was not a cloud to be seen, and the whole country around lay like a superb panorama before me. It would be difficult fully to describe what I saw, and I will therefore in a few words give the leading features of the scene. To the north appeared the rocky point of Taura-te-Weka, with other bold headlands, stretching into the sea; above these rose a mass of mountains, amongst which towered the snow-clad giants of the central chain.

Deep valleys indicated the courses of the great rivers, amongst which the valley of the Karamea was most conspicuous. Towards the east lay the Lyell mountains, with their bold unbroken outline, over which appeared the rugged peaks of Mount Owen, and of the mountains at the head of the eastern branch of the Matiri. Beyond the Lyell range, where it sloped towards the Buller, rose Mount Murchison, the three peaks of which, visible from Nelson, are well known. Following the line of the large opening between the Lyell and Brunner ranges, and the eastern mountain chain commencing above the Top-house and running to Mount Franklin, the highest point in the Spencer mountains, I observed in front of the latter a series of lower mountains, forming regular cones, which plainly told the history of this great fissure. The valleys of the Tutaki, the Matakitaki, and the Maruia, were also visible, and above the eastern chain, in the direction of the head of the Rotoroa lake, appeared Tapaianuku, the highest summit of the Kaikoras. Towards the south-east and south, the rugged lines of the Brunner range were visible, broken through by the Awerau, the principal tributary of the Inangahua, over the broad valley of which the view reached to the Grey country, in which I recognized with pleasure our old friend Black-hill. This splendid panorama was further bounded by the southern Alps, in front of which Kaimata lay conspicuous. More towards the south, across the Buller, I looked down into the valleys of the Ohi-ka-iti, and the Ohi-ka-nui, shut in at their heads by the rugged masses of the Paparoha chain, the whole presenting one of the finest and most magnificent views that it is possible to conceive. Whilst I was occupied in sketching this extensive panorama, sitting amongst the snow, and warming my fingers at a small fire kept alive with Alpine scrub, Mr. Burnett, at my desire, collected specimens of the rocks at the eastern side of the mountain, and took measurements of the different strata. For this purpose he had to descend the mountain for some distance through snow and ice into a frightful gully, and I was glad to see him return in safety. In order to complete my work, we, on the next day, ascended the mountain for the third time, the atmosphere still remaining clear, and the contours of the mountains surprisingly sharp. The Papahaua chain consists of two ranges, one near the sea, running north, the other, six miles to the east of it at the Buller, running north-west, the two afterwards uniting in a common centre, at the northern extremity of the range near the sea. I named the highest peak, upon which I had fixed my station, Mount Rochfort, after the first European who had ascended it, the highest point in the eastern chain Mount William, and their common terminus on the north, Mount Frederick. Between these two chains lies a platform, from 1,300 to 1,800 feet high, the three last-named peaks each rising to an altitude of about 3,500 feet. This plateau is intersected by an incredible number

of small streams, rivulets, and precipices, and is covered with manuka and sub-Alpine scrubs. I determined to cross this plateau for the purpose of ascending the highest point of the eastern chain, and in case I could not finish my work there, to descend to the Orikaka, which was flowing at the eastern side of it, and thus reach the Buller, but as the Maories, who are expert in building canoes, had deserted me, I was obliged to abandon my original intention of going down that river to its mouth, and determined to return by the same way we had come. Starting next morning, therefore, we left part of our provisions and one tent on Mount Rochfort, the weather still continuing magnificent, although very cold. On descending to the plateau we found it worse than our anticipations. It was extremely broken, and we were kept climbing up and down the whole day without intermission. As it offered plenty of sections, however, I hoped every moment to discover coal, but although I searched with the greatest diligence, removing for that purpose snow and ice from the sides of the hills, I did not at first succeed in finding any. In the evening, however, we found some small pieces of coal in one of the brooks near our camp, and I at once, accompanied by Mr. Burnett, followed these indications, until night began to close upon us. The next morning we again followed the same stream, the pieces of coal became more numerous and angular, and we at last reached a narrow valley, the rocks on both sides of which overhung. The rivulet here disappeared amongst huge masses of rock covered with deep mosses, and lying one upon the other so as to form a sort of irregular cavern. This we attempted to explore with lighted vestas, wading in the icy waters, but the opening soon became so narrow that we were unable to proceed. It was evident that a coal stratum, probably of great thickness, had here been washed away, the overlying rocks falling in. Although this valley was probably not more than 2,000 feet above the level of the sea, deep snow lay in it, and in some places the ice was so thick as to permit us to enjoy the pleasure, seldom obtained in New Zealand, of a slide upon the ice.

Our road led us the next day over the same kind of ground, and I still looked anxiously for indications of coal, but in vain. At length, however, my search was rewarded, for, having passed up a little waterfall in a deep gully, I saw that the overhanging rocks were compact grits, and although my whole party had passed over the fall, I at once returned, and having removed the moss which covered the stratum below these grits, I found, to my great joy, a large seam of good coal. Of course I stopped my party, who very soon returned to assist me in uncovering the seam, which, on removing the moss and ice that encumbered the fall, proved to be eight feet two inches in thickness of *pure coal*. A further examination of this valley, which I named Coalbrook Dale, proved that this seam was striking and dipping regularly, and I therefore

at once took measures to fix its position. In the afternoon we again resumed our journey, and in the evening reached the foot of Mount William. During the night we heard for the first time the cry of the kakapo, and of the large kiwi, to which we listened with great interest, regretting that we had no dog with us to catch any of these now scarce birds.

We had a hard pull the next day, the ascent of the mountain being very steep, and the vegetation of the sub-Alpine scrubs so close and spreading that we had to cut our road through. We therefore advanced slowly, and it was past noon when we reached the ridge which led to the summit, which consisted of a broad plateau, covered with snow, and intersected by numerous little rivulets. In the afternoon we got to the top of the mountain, where my occupations kept me until sunset, so that we were obliged to pitch our tent there, shovelling the deep snow away with a plate. It was very cold, and it was not without great inconvenience that I could sketch or map, the pencil continually threatening to fall from my freezing fingers.

I was much interested here on observing the tracks of numerous kakapos, or night parrots, which seemed to lead a tranquil life, unmolested by wild dogs, by which these beautiful birds have almost been extirpated in other places, existing now only on the mountain tops and in a few very remote valleys. It was not without great trouble that we collected firewood, the dwarfish stems of the Alpine plants being scarce and half buried in snow. It was, however, one of the finest winter nights I ever experienced, and it was wonderful and beautiful to see the valleys below us in deep shades, whilst the summits of the mountains around glowed in the rich red tints of the declining sun. As the night advanced, the stars shone with extreme brilliancy, the splendid constellations of the southern hemisphere rising one after the other above the sharp serrated outline of the eastern mountain chain, and the dazzling snow-field round us, illuminated by the flames of our camp fire, imparted additional grandeur to the scene, which was enlivened by the peculiar cries of the kakapo and kiwi. It would be difficult to imagine anything more majestic or interesting.

The next morning, the 10th July, we ascended, just before sunrise, to the summit, having camped 100 feet below it on a small level spot. It was a glorious sight, and the sharp outlines of the mountains and deep shades gave me an opportunity of sketching more minutely the details of the scene. The view from Mount William is similar to that from Mount Rochfort, except that, being above the Orikaka valley, close to the junction of the Inangahua with the Buller, a much more complete view of that and of the Grey district is obtained. As I had got from these two points more topographical details than I had expected, I found it unnecessary to go further in this direction, and therefore

at noon we started upon our return to the Buller, not without regret at leaving such a magnificent panorama. We camped the same evening in Coalbrook Dale, and although we had a good fire, it was so cold in the tent (22° Fahrenheit) that the ink froze in my pen, and the Indian ink in my brush, so that I was compelled to abandon the idea of noting down my day's work. From this point I determined to follow one of the streams as far as the coast, in order to get a more complete section of the strata, and in the hope that I should find the coal at the foot of the mountain exposed by the action of the river. I took two men with me, and directed the others to return, by the same road we had come, to our old camp at Mount Rochfort, and thence to bring on the tent and other things left there. We all started together, but had not travelled half a mile when we were enveloped in a dense fog, which afterwards changed to a soaking rain. Without having a mountain map before one, it is impossible to conceive or understand the broken character of the surface of this plateau. In fine weather, with the summit of Mount Rochfort before us, we could easily have found our way, but enveloped in a fog which did not permit us to see twenty paces before us, we constantly came to precipices, and were unable to find an unbroken spur. I thought it better, under these circumstances, that we should not separate, and we therefore followed down one of the streamlets flowing to the coast. The rain fell in torrents, and during our descent we were obliged to wade through the water, and jump from rock to rock in the bed of the river. After a mile's walk we reached a larger stream flowing from the south-south-east, and here more serious difficulties commenced. The river frequently formed falls from ten to fifteen feet in height, with perpendicular walls on both sides, and it was always a difficult task to descend these falls, which we only effected either by gliding down the smooth surface of the rocks, or by climbing up the walls and working our way through the dense vegetation on their borders. After two more miles the stream disappeared suddenly, falling at least 200 feet perpendicular. As it was impossible to descend this fall, we ascended the mountain side, and travelled by compass, due west, over a small platform. After some scrambling through dense mountain vegetation, we again descended the mountain to the stream, which was now much larger, and its valley broader. Rain, mingled with snow, fell incessantly, and the waters of the river being very cold, we felt occasionally much cramped. When evening closed upon us we had not, as we had hoped to have done, reached the plains. Although we could have found a tolerably good camping ground here, we proceeded, in the expectation that after passing a high rocky gorge before us we should find a better one, but we were cruelly deceived; it became dark whilst we were in the gorge, with perpendicular and overhanging cliffs from 200 to 300 feet on both sides. We passed a miserable night, camping

under a high overhanging cliff, whilst the surface of the ground, consisting of huge angular blocks of sandstone, formed our bed.

The next morning, although it continued to rain, we resumed our journey, climbing several magnificent falls, jumping over huge rocks, round, slippery, and covered with moss, and often only broad enough for one's foot, where a false step would have cost life or limb. One of my party fell twice, having confided in the branches of trees, which sprung from crevices in the almost perpendicular walls of the gully, the roots of which however were not strong enough to hold him. Having descended the River Whare-atea for some distance, we reached the swampy plains, and after wading for another mile in the icy water of the river, we managed to ascend its banks to the level of the plains, which, in consequence of the heavy and continued rain had become almost impracticable, and although by the time we arrived at the edge of the forest it was becoming dark, we endeavoured to reach the sea shore, where dry firewood could be obtained. Owing to the murky state of the weather it soon became too dark to see anything before us, and we therefore guided ourselves by the sound of the surf, but after a vain attempt to reach the shore, getting severe falls over prostrate trees, and cutting our faces and hands against stumps and toi-toi grass, we gave up the attempt, and camped. By the aid of a small piece of candle we managed to pitch the tent and to get into our blankets. It was impossible to light a fire, and as we had unfortunately nothing except flour with us, we were obliged to go to bed without supper, but owing to the great exertions of the day we were soon fast asleep.

The next day we reached the Buller, and again enjoyed the comforts of a roof. Mr. Rochfort, who had arrived the night before, came to see us. He had finished his work, and intended to start next morning for Nelson, so that we were soon all busy writing letters for home. He was good enough to allow one of his Maories, who had travelled three times round the coast, to remain with me, and I take this opportunity of thanking him for that, and for the many other services he rendered to me and my party at our several meetings.

After Mr Rochfort's departure I explored the level country on the southern side of the Buller, and then prepared to return to Nelson. As I did not know how long it would take me to reach West Wanganui, on account of the great amount of geological and topographical work I had to do, I engaged two other Maories at the pah to carry provisions as far as the Karamea, or Mackay, river. Just as we were about to start, heavy rain set in, and we had again to practise patience. We thought that if the climate here was always as wet during the winter as we had found it, it was not likely to rival that of Nelson; for although the natives assured me that they had not for many years experienced such horrid weather, I doubted their statements, until I

arrived in Nelson, and heard that all over New Zealand the autumn and winter had been wet and inclement.

We started on the 23rd of July, fine weather having set in, with sunny cloudless days and cold frosty nights; and after a walk of fourteen miles over a long sandy and pebbly beach, crossing on the way the Orowaiti and Wharetea, we camped about three miles south of the Ngakuwaho stream.

The next day we continued our route; but my right foot, which I had hurt about a month before, pained me very much. As I hoped however to walk it off, I determined to go on. On arriving at the Ngakuwaho stream, the last river flowing from the Papahaua range, finding its boulders consist of coal, shales, and grits, I threw off my load, and ascended the river to examine the cliffs on both sides of it, but after walking half a mile I was compelled to return, being scarcely able to use my foot. This obliged us to halt in the middle of the day, as it had become so swollen that I could scarcely get my boot off, and the weakness of the foot from the injury it had received would not permit me to carry my present heavy load. In order to husband our provisions, I sent on Mr. Burnett, with one of the Europeans and the two Maories, to the Karamea, with instructions to deposit the provisions, to send back the Maories, and to explore the valley of that river until I arrived, which I hoped to do in a few days after him.

Although I tried the strongest remedies, I did not, until after several days, succeed in reducing the swelling, but I still continued unable to stand. During the whole of this time we had the most glorious weather, and it may be easily understood that I felt greatly disheartened at a delay which compelled me to miss it, whilst our provisions were diminishing rapidly. This alone was sufficient to make me impatient; but to this was added the annoyance of thousands of sand-flies during the day, whilst the night was disturbed by numbers of troublesome rats.

I sent two men back to the Buller to get some more flour from the natives; and after they had returned, they proposed, as the water in the Ngakuwaho was brackish, to construct a hand-barrow, and carry me on a mile and a half to the banks of a little streamlet, which fell over a cliff on the sea-shore. Before consenting to this I tried my foot, and found, although with considerable pain, that I could walk on my toes, so that I declined their good-natured offer, and started with them, moving slowly, and walking through the surf in order to strengthen the suffering limb. On arriving at the stream I found that I could manage to proceed, and after bathing my foot in the falling water, I walked two miles further. In the evening the two Maories returned, and brought a letter from Mr. Burnett, stating that the man with him had severely scalded his foot, so that he was unable to proceed, and that he hoped to see me soon. This, as may be imagined, did not diminish my previous vexations.

On the 1st of August I reached the Mokihinui, a large stream which can only be crossed in a mokihi (a kind of raft formed of bundles of flax-sticks tied together), and at which we camped. Here the cretaceous formation again commences, and instead of the sandy beaches, which for the last twenty-five miles formed an easy road, we found wild precipitous cliffs, over and round which the traveller has to make his way, with here and there only small sandy beaches occurring at irregular intervals. I continued to limp along, but fortunately every day my foot became stronger.

After twelve miles' walking over this rugged shore, the scenery of which however was very beautiful, we arrived at the foot of the Otahu-hill, which we had to ascend, as its sea slopes were too abrupt to permit of our proceeding along the coast. The ascent is a very steep one, and it was dark when we reached the top, where we camped. From the position of this mountain I was convinced that it would make a good topographical station, for which reason I determined to remain there the next day; but, after going all round it, I found to my regret that the height of the trees on its summit prevented me from getting a view, and as it would have cost us at least eight days' hard work to clear a sufficient space upon the summit, so as to have a view of the surrounding country, I selected the highest tree I could find, on the top of which I established my station. This I did by constructing a sort of nest in the uppermost branches, supported by poles fastened to the branches below. To ascend the tree we constructed a ladder, which we finished in five hours, and I ascended to my observatory, the view from which was very extensive and splendid. I overlooked the river beds of the Mokihinui, Tunipohu, Wanganui, Otumahana, and Karamea, and the level land of the last-mentioned river. The mountains rose around me in all directions, and I observed with pleasure the peaks of Mount Arthur towering above the chains to the eastward. It was not without great perseverance that I managed to get the necessary bearings, having to tie the compass legs to a branch, whilst the wind frequently moved my observatory bodily to and fro.

Descending the hill next morning by a slippery watercourse, we met with Mr. Burnett at the mouth of the Tunipohu stream, where he had camped with his patient for the last eight days. Fortunately the man's foot was so much better that we were able to proceed. After having passed for three miles over huge blocks of limestone, and round precipitous headlands, we camped that night at the mouth of the Wanganui. It is here that the level country of the Karamea begins.

It rained during the night and the whole of the next day, so that the series of beautiful days that we had lately enjoyed were again over. Anxious, however, to proceed, we started in the middle of the day, a fine hard sandy beach permitting us to walk at

a fast pace. Towards evening the weather cleared, and after having passed over the undulating tract of sandy ground which encloses the large tidal inlet of the Otumahana and Karamea rivers, we reached the banks of a lagoon, which we crossed, and camped on the northern bank of the first-mentioned river.

On the following day, which was fine, I crossed the mud-flat, for the purpose of establishing a station on one of the sand hillocks at the south-western side of the lagoon. This took us so much time, that it was twilight when we reached the Karamea or Mackay river, having had to wade over two miles of mud-flat, in which we sometimes sank knee deep.

The Karamea is a very fine river, and at our camping place was divided into three arms, flowing rapidly over a shingly bed. As there was no mokihi on our side, no travellers having re-crossed since Mr. Rochfort had passed over it before us, and not finding any flax-sticks, I sent one of the Maories to cross the river for the purpose of fetching the mokihi, which was hung up to a tree on the other side. Seeing that the river only took him to the hips, although it flowed very rapidly, I determined that we should all venture across with our loads. The water was extremely cold, and we had a considerable distance to go, but we got safely over.

From the mouth of the Karamea a magnificent view is obtained of the mountain gorges through which the principal stream and its tributaries flow, and which unite near its mouth. We continued our journey in the afternoon to the Oparara, a pretty little stream, three miles north of the Karamea, having also a lagoon, but of small dimensions, on its northern bank.

The weather was very cloudy when we started the next morning (August 9), and shortly after a heavy storm came on from the north-west, which lasted for several hours, and drenched us to the skin; but as we had before us a good sandy beach, I determined to proceed, and if possible to reach the Haihai before it had become too much swollen for us to cross it. Three miles north of the Oparara the mountains again approach the coast, but the sandy beach continued as far as the Haihai river, at which we arrived at eleven o'clock. As the rain did not cease, we camped on the northern bank of the river, near a precipitous bluff, against which the waves were breaking furiously. It rained without intermission during the rest of the day and night, and we all began to feel very uncomfortable in our leaky tents, which were full of holes, and were too tender to be mended. The water ran through in streams, wetting blankets and everything that we had.

Although the rain ceased the next morning early, we could not start until noon, because the drying of the tents and clothes, when everything had been thoroughly drenched, always took up a considerable time. As it is impossible to pass round the Haihai

bluff, the road leads over a hill from 600 to 700 feet high, through dense vegetation, and then descends, by a steep and rapid water-course, to the beach on the northern side of the bluff, which on this side also is beaten by the roaring waves. After walking another mile on the sand, the shore again became rocky, compelling us frequently to climb over rugged granitic headlands and large boulders. This continued for several miles, until we neared the Whakapoai, or Heaphy river. Before reaching it we again found secondary limestones lying upon the granitic rocks, through which small streamlets had forced their way, cutting through them, and leaving perpendicular walls on both sides, on the tops of which whole groves of the nikau palms spread their graceful forms. During this day I had observed a considerable change in the vegetation, which had become more luxuriant.

We soon reached the valley of the Whakapoai river, on the southern side of which a small flat of drift-sand has been formed. Upon its northern side high limestone cliffs ascend abruptly, both from the river and from the sea shore. As there is no ford near the sea, we had to ascend the river for half a mile, partly over sand, partly over rugged rocks, to a little fall. We found the water deep, reaching nearly to our armpits. Having examined the river bed for another mile upwards, we again started forward, and ascended a steep and densely wooded hill between 600 and 700 feet high, from which we obtained a very fine inland view over the Whakapoai valley, which contains some good and well-timbered level land, and over the mountain ranges bounding it on both sides. The descent from this hill was very steep, its seaward side presenting picturesque cliffs nearly 800 feet in perpendicular height. It is at this point that the most difficult part of the coast journey begins, and it is almost impossible to describe in words the wildness of the scenery. Having walked two miles from the foot of the mountain, we camped near a clear streamlet.

Starting the next morning, the 12th of August, our route passed over rocky points, with small sandy beaches between, whilst just before us lay the bold promontory of Taura-te-Weka, which we reached at noon. Between this promontory and the main range is a small ridge about 100 feet high, covered here and there with flax bushes and grass; this we had to ascend, and although it offered barely sufficient space for a footing, I established a topographical station upon it. It was not without great trouble that our giddy companion was got up the ridge; he actually refused to proceed, and lay down upon finding that on the northern side the hill was very steep; so that after having carried down our own loads, we were obliged to re-ascend the hill to fetch him. In one place, where it is necessary to make use of a slippery crevice in the side of the rock, which for about thirty feet falls perpendicular, with nothing to

take hold of, I thought we should never get him down. We had, in fact, to hold him fast on both sides, and place each of his feet as we proceeded. With much trouble we passed him down this dreadful spot, and felt relieved when we got him safely to the sea shore.

Our route now continued over granite cliffs, with almost vertical sides, the ledges of which were hardly wide enough for our footing. Over these we advanced slowly, and in some places we were compelled, by the steepness of the cliffs, to pass round them upon rocks lying in the surf, placed at unequal distances and of unequal heights, to get over which we had to wait for a receding wave, and then jump as fast as possible. During this process we were occasionally caught and wetted through, only saving ourselves by holding fast to the rocks whilst the water rushed to and fro, the effort requiring our entire strength. All my party, excepting myself, wore pereiras, or Maori sandals. I was unable to do so, as my foot was still painful, and my boots being less fitted for such work, I had to be doubly careful. This part of the road, from Taura-te-Weka to Kaurangi point, is called by the Maories Taupiri-kaka, and is much dreaded by them.

During the whole night we had heavy rain, so that being compelled to dry our clothes and tents, we could not start until ten o'clock the next morning. The day's work before us was a very hard one, as we had to cross several rocky headlands from 100 to 150 feet high, with nearly perpendicular sides, in comparison with which Taura-te-Weka was of easy access. Here again our giddy companion gave us much trouble, as we were obliged to accompany and assist him both up and down, which cost us considerable time. At one projecting cliff round which we had to pass by jumping over rocks, the native who knew the road went first, as the waves receded; Mr. Burnett followed, and I was the third. Whether our guide had not watched carefully enough, or that the sea had not retired as far as usual, he crossed over with great difficulty. Mr. Burnett, when in the centre, being unable to see the next rock, which was covered by the water, jumped back to the rock upon which I stood. I, of course, also endeavoured to get back, but the rock behind me had already disappeared, so that we had barely time to sit down and cling to the fissures of the rock, when the wave struck it with stupendous force, whirling and foaming around us. Before we could extricate ourselves the wave returned, and again enveloped us in foam. But, although the force of the coming wave was amazing, it appeared to be much less than that of the retiring water. We certainly more than once thought that we should not be able to stick to our slippery seat. It was a moment of great anxiety for our companions on shore, who thought that we should be unable to resist the violence of the waves, and that we should be dashed to death on the rocks around us. At length, however, the water receded

so far that we were again able to start, and fortunately succeeded in getting safely round, of course drenched to the skin, as the water several times washed over our heads.

The tide flowing stopped us at three o'clock, and we only found just room enough between the rocks, at the side of a small streamlet, to pitch our tent. The wind blowing very strong, it was really magnificent to see the majestic waves dashing with fury against the high rocks on both sides of our camping ground, covering everything around with foam and froth.

We resumed our journey the next morning, the nature of the coast being still the same, but becoming wilder and wilder as we advanced. All along the edge of the sea stood rugged masses of rock, often formed into gigantic triumphal arches, as if nature had erected them to glorify its own power. We passed several streams of different sizes, the great abundance of fresh water being everywhere the same. In order to have good stations, we sometimes climbed to the tops of the furthest rocks in the sea, where we doubly enjoyed the wild scene around us. During the first part of this day's journey, we passed over several cliffs of various heights and degrees of steepness, amongst which was one, where, owing to an overhanging rock, we had great difficulty in getting our giddy companion over. Mr. Thomas Brunner, the first intrepid explorer of this country, in his journal describes this cliff in the following graphic manner:—

"The Taupiri-kaka is a steep cliff, against which the waves break on the perpendicular face of the rock, so as completely to prevent it being passed below, while in-shore the mountain rises both steep and high, and presents also an impassable barrier. About eighty feet above the sea, at a part where the point juts from the mountain, was a place which seemed as if it might afford a passage, and to this we climbed by a difficult rocky path through karaka bushes, and over and amongst large fragments of granite; but on the other side the descent appeared appalling, and we certainly for a time deemed it impracticable. At length, finding the remains of a rotten rope made by the natives, we agreed that what had been done once could be done again, and upon looking down we at length perceived a ledge and some holes in the face of the rock, which might afford foothold. We, therefore, took courage, and descended; but we found the descent most hazardous in passing round an overhanging rock, where it was necessary to lean backwards in order to get from one ledge to the other."

After reading this description, it will be easily understood that we had greater difficulties to overcome, as we generally had to go twice over the same ground on these precipices, on account of the giddiness of one of the men.*

* Mr. Brunner believes the name Taupiri-kaka is applied by the natives only to one rock; but they assured me that this name is given by them to the whole of the rugged and dreaded district between Taura-te-weka and Kauranga point.

In the afternoon we arrived at a small stream, which we ascended for half a mile, and then climbed the steep sides of the Kauranga mountain, 1,200 feet in height, on whose ridge we continued for a mile, when we again descended to the rocky beach. This, however, was the end of our hard walking. A quarter of a mile further brought us to a beautiful sandy beach, which we followed to Ihua Tuaroa point, consisting of cretaceous rocks, bearing a great resemblance to a ruined castle.

From this point, looking towards the north, the coast line is smooth, and we saw before us the heads of the West Wanganui harbour, above which stood the rocky points of Cape Farewell. Towards the east the low country was bounded by the Whakamarama range, which, with the Haidinger peak, was visible, whilst to the south lay the rocky road around and over which we had travelled for the last few days.

I may be permitted to warn persons who are liable to giddiness not to travel by this route, but rather to select that which leads up the Aorere valley, and from thence to the Heaphy; but for a man with a stout heart and a strong head, nothing can be more interesting than the journey along this coast, particularly if accompanied by a friend possessed of the same qualities. They may, it is true, meet with disagreeable mishaps, but they will be amply compensated for their troubles by the wild beauty of the scenery, which is such as cannot well be described in words.

We were now near the end of our journey, and we hurried on as much as my pursuits would permit.

On the 15th of August, after two miles' walk over a hard sandy beach, we arrived at the mouth of the Awaruatoa, but the tide being too high to permit us to cross then, we had to wait two hours. This delay produced a good deal of impatience amongst my party, for we saw on the other side, in a conspicuous position, a whata, or provision store, and although we had not, since we left the Buller, been short of provisions, except sugar, we all longed to know the contents of the whata, and, what was of more importance, we expected to find in it letters from our friends.

There are two fords over this rather deep and wide river; one inland, and one near its mouth, close to the surf. We selected the latter, and although the water reached to our arm-pits, we all got safely over. The whata contained flour, sugar, and tea, sent by Mr. James Mackay, at the request of the Provincial Government of Nelson, which had thus done its best to facilitate my proceedings through the country. I now take this opportunity of thanking Mr. James Mackay for his many acts of friendship, and for the valuable information which I from time to time received from him during my journey.

Continuing our route, we passed the Rivers Anaweka and Tuimahui-hui, walking partly on sandy beaches and partly over low cretaceous rocks, and after having travelled ten miles, we camped

amongst the hillocks of drift-sand which on this part of the coast lie between the low hills and the sea-shore. As if to bid us adieu, the horrid weather which we had so frequently experienced, again set in during the night, the rain came down in torrents, and continued the whole of the next morning with unabated violence.

Fearing that we might be delayed by the Paturau river, we started, notwithstanding the rain. It was very cold, a sharp north-west gale blowing the drops in our faces, which pricked us as if with needles. The tide was so high, owing to the gale, that we could not get round several of the rocky points along the shore, and which we had therefore to climb over. In some instances, we waited for the receding waves, and ran through the water round these points, and it was not without several mishaps, though not of a serious character, that we reached the Paturau river. At ebb tide this would have been an easy walk, over a hard sandy beach the whole way, so that the coast journey, with the exception of the places enumerated in my description, will be found perfectly easy if taken at the proper time of the tide. When we reached the Paturau, it was swollen, and gave us more trouble than any river we had previously crossed. A four-mile walk brought us to the mouth of the Hapu, where the native track leaves the coast, and follows the streamlet, so as more easily to cross the limestone range between it and the West Wanganui mud-flat. This range is from 1,000 to 1,200 feet high, and is densely clothed with forest nearly to its summit, where the trees are replaced by manuka and other scrub.

The weather clearing towards evening, we obtained from the summit of the range a fine view over the picturesque inlet of West Wanganui, and of its islands, and the many hills around it covered with wood. Towards the south, the eye swept over high mountain chains, deep gorges indicating the courses of the various rivers we had passed over during the last few days. On the east lay the broad swampy plains of the Manga-manga-rakau, bounded by the Whaka-marama range, over which appeared the snowy peaks of the mountains on the eastern side of the Aorere valley. Instead of crossing the mud-flat, we followed the western shore, and towards evening reached some Maori huts lying at the southern head of the inlet, and although the Maories were not there, we were soon comfortably lodged.

At sunrise we fired some shots, and in a short time, although the weather was stormy, we had the satisfaction of seeing a canoe approach from the north-western corner of the harbour. It was our friend Puaha, who had come over to fetch us, and having embarked with a fair wind, we soon reached the pah at Otauwharo, where we were received and treated by the chief Matiu with true old Maori hospitality.

During the day I examined the interesting formation near our dwelling, and continued my researches on the following day by

crossing the hills to the open sea coast, where I climbed over the rugged rocks for several miles both to the north and south, by which I soon gained a clear insight into the geological character of this district.

The weather, which during the last few days had been showery, again became very foul, and for two days we had nothing but hail, torrents of rain, and heavy gales of wind, which compelled us to stop in the whare. This was not at all pleasant to men who had so long lived in and breathed the pure fresh air, for the whare, amongst its other defects, was very smoky. I tried, during the afternoon of the 20th August, to get over again to the southern side of the harbour, but the gale was so fierce that we found it impossible to do so.

On Tuesday, the 21st of August, we started with the earliest dawn, although it still rained and blew heavily from the southward. After a very muddy walk of three hours, we reached the Pakawau river, and arrived at Mr. Flower's house at the township itself in the afternoon, visiting on our way both the old and the new coal works. It was pleasant to us, after an absence of eight months, again to see a European house, surrounded by a garden and fields, and to enjoy a hearty meal prepared for us by our hospitable host. Here I separated from my party, whom I sent on to Collingwood, whilst I proceeded to Mr. James Mackay's farm, from whence I intended to visit Cape Farewell and the sandspit.

I was received by Mr. Alexander Mackay, whom I had seen last in the Mataki-taki plains, with cordiality and kindness; and the next day being fine, we started, accompanied by Mr. Fletcher, to the sandspit and Cape Farewell, which latter I thoroughly examined. It was not without emotion that I gazed at the magnificent panorama which lay before me, as I stood on the summit of the bold headland of Cape Farewell, embracing as it did D'Urville's Island, the Pelorus mountains, Separation Point, and the high snowy chain at the head of the Takaka and Aorere valleys. It was here, too, that I bade farewell to the country through which I had so long journeyed, and which, though at present a useless wilderness, I hoped soon to behold the seat of flourishing settlements, its plains and terraces the pasture ground of sheep and oxen, whilst the pick of the miner was bringing into use the enormous wealth of its coal-fields.

On the 23rd of August I reached Collingwood, but not finding any vessel for Nelson, I devoted a day to the examination of the gold-field in Lightband's and Golden gullies; and at length, on the 28th of August, returned to Nelson by the cutter Supply.

In concluding this part of my report, it is an agreeable duty to me to express my thanks to Mr. James Burnett, and to the men of my party, for their hearty exertions in furthering the objects of

my journey. They manfully bore their fatigues and privations, and I hope they may live to find their greatest recompense in the feeling that if the mission with which I was entrusted produces any important benefits to the Province of Nelson, it was in a great measure through their assistance that I was enabled to obtain the results from which those benefits will ultimately be derived.

CHAPTER II.

From the entrance of Blind Bay, the mountain chains by which it is enclosed may be distinctly traced as they stretch towards the south. That on its western side is continuous for a considerable distance, rising at Separation Point, and running thence southward towards the western extremity of Mount Murchison, where it appears to terminate abruptly. On the eastern side of the bay, over the low hills which surround the city of Nelson, are seen the high mountains named Ben Nevis and Gordon's Knob, forming part of a chain beginning near Queen Charlotte Sound, and running thence to the Spencer mountains. Between these two ranges an undulating table land is visible, apparently of little height, which stretches in a south-westerly direction to the base of Mount Murchison. On ascending the last-named mountain, an opening between the eastern and western chains becomes visible, extending as far as the eye can reach in a south-south-westerly direction. At a distance of seventy-five miles in a straight line from the city of Nelson, this opening or fissure, on each side of which the above-named ranges have been upheaved, and which up to that point maintains an average breadth of eight to ten miles, narrows, and the mountain chains reach their greatest altitude. Their spurs run into each other, almost uniting their rugged masses, and forming for eight miles a succession of narrow gorges, through which several rivers flow. The mountains then again recede from each other, the eastern chain running in a southerly direction, and the western turning south-west towards the West Coast, whilst the lower land between widens to a considerable extent.

In the northern part of this remarkable fissure, the lakes which occur are found at the foot of the eastern chain, whilst on its southern sides lakes are found (in the Province of Canterbury) lying at the foot of the western range, thus indicating the natural watershed of the island.

But this is not the only fissure by which the northern part of this island is divided; another large opening cuts in a transverse direction through the two mountain systems above described,

running east by north and west by south, and intersecting the longitudinal fissure near Mount Murchison. A few miles to the north of Lake Roto-iti the eastern chain is broken through, and a pass of little elevation leads into the valley of the Wairau, the course of which from this point can be traced almost to the sea. The western chain is in like manner broken through by the Buller river, whose course can also be followed by the eye to its mouth on the West Coast.

The longitudinal fissure above mentioned has an average altitude of 2,000 to 2,500 feet above the level of the sea, and exhibits a hilly plateau, on which, near the eastern chain, several regular conical and dome-shaped mountains rise to an altitude of 3,500 to 4,000 feet above the sea level. This plateau is moreover intersected by streams which run in deep gullies, and, with the exception of some grassy terraces and open patches on the banks of these rivers, is densely covered with forest. The openings through which the Wairau and the Buller flow are merely the valleys of rivers, narrowing where they receive no tributaries, to mere gorges, and breaking in a transverse direction through high mountain ranges.

As I began my exploration at Lake Roto-iti, I shall adopt it as my starting point in describing the physical character of the eastern lateral chain, at the same time connecting with it the description of the sources of the Buller and its tributaries. This eastern chain attains its greatest elevation (rising abruptly on the eastern side of the longitudinal fissure) in the Spencer mountains, whose peaks attain an altitude of at least 10,000 feet, and are covered with perpetual snow. Three of these peaks are very conspicuous; the central one, named by me Mount Franklin, lies in latitude 42 deg. 1 min. South, and longitude 172 deg. 37 min. East. From this, as a centre, the various ranges branch off to the northward and southward. I found, upon a careful examination, that the main ranges below the above-mentioned peaks are 8,000 feet, and the ranges which branch from them 6,500 feet high. These ranges are covered, to an altitude of 4,000 to 4,500 feet, with dense forest, above which an Alpine vegetation begins, and the summits form meadows of short smooth snow-grass, the whole reminding me greatly of the wild Alpine scenery of Switzerland.

The most easterly of the branching ranges which came within the limit of my researches, was the St. Arnaud range, so named by Mr. Travers when he passed through the gorge of the Wairau in 1854, and lies on the western side of that river, forming, until it reaches the Top-house, the watershed between the east and west coasts. This chain, beginning on the southern side of the old pass from Nelson to the Wairau, soon rises to an altitude of 6,500 feet, its western base forming the eastern shore of the beautiful Alpine Lake Roto-iti. On the south-western side of this splendid water basin, a second range begins, forming, above

the lake, a small plateau 4,700 feet high, from which afterwards this mountain rises to an altitude of 6,200 feet.

This second chain I have named the middle range. These two ranges appear to unite about six miles south of the southern extremity of Lake Roto-iti, and form a high serrated nucleus of peaks from 7,000 to 7,500 feet high, which I named Mount Travers, after my energetic friend Mr. W. T. L. Travers, who has done so much towards our knowledge of this hitherto unknown region. It is in this range that we have to look for the principal feeders, and, considering the distance from its mouth, for the actual sources of the Kawatiri, or Buller. Out of the southern extremity of the valley formed by these two ranges, flows the principal feeder of the Roto-iti lake, meandering, as I observed from Mount Robert, which lies above it, for a few miles through a picturesque valley, and then lost in a frightful mountain gorge. The sources of this river are sixty-three miles in a straight line from the mouth of the Buller.

On the western side of Mount Travers we meet the sources of the Pukawini, or Howard river, which falls into the Roto-iti river about nine miles below the lake. The united ranges then stretch towards the south, and form, above Lake Roto-roa, a conspicuous dome-shaped mountain mass, 7,500 feet high, which I named Mount Mackay, after Mr. James Mackay, who was my companion whilst exploring this part of the country. Here the chain falls abruptly, and a large valley appears, through which flows one of the principal feeders of the lake, having its source near that of the Waiau-ua, on the eastern side of the Spencer mountains, whilst another streams joins it, flowing in the southerly direction from Mount Travers to the eastward of Mount Mackay.

The Maories, in travelling in former years from the Port Cooper plains towards Wakatu (Nelson), used this pass, and describe it as easy, and as possessing a gradual and uniform gradient. Here, therefore, we have a lateral break in the chains, dividing their northern parts from the Spencer mountains proper. Lake Roto-roa lying more to the westward, and 258 feet lower than Lake Roto-iti, has, besides the first-mentioned feeder, which I called the Sabine, the course of which is north-north-west, another important one, which I named the D'Urville, running through a deep gorge, in a nearly northern direction from Mount Franklin. The western side of this stream is formed by another diverging range, stretching from the highest mountains in the northern part of this island, and running parallel with the D'Urville to the lake, where it terminates abruptly. The outlet of the waters of Lake Roto-roa, which are at least double the volume of those flowing from the Roto-iti, joins the latter near Mount Murchison, after a rapid course of five miles and a-half, and their united waters then take the name of the Kawatiri, or Buller, the Roto-iti passing to the junction through a valley formed by wooded mountain spurs,

having gentle slopes, and called the Devil's Grip, a name given to it by a former explorer, not from the ruggedness of its natural features, but from the luxuriant growth of lawyers, wild irishmen, spear-grass, and other prickly vegetation with which the banks were encumbered.

The Buller, from this point, is a fine large river, and only fordable after a continuance of fine weather at a point where a large shingle bed forms a diagonal ford. After flowing in an easterly direction for six miles, it receives the Owen from the north, which runs into it through a large valley trending north-north-east from the high mountain chain which forms the water-shed between the West Coast and Blind Bay. After its junction with that stream it turns suddenly to the south, and receives the Murchison, a fine stream rising in the mountain of that name, and flowing nearly due west. Five miles lower down it receives the Tutaki, or Mangles, the sources of which lie in the Spencer mountains. One of the branches of the Mangles, named the Tiraumea, comes from Mount Franklin, having between it and the D'Urville, as a dividing range, the ridge before mentioned, whilst nearer Lake Roto-roa it receives its waters from the cone and dome-shaped hills named Mounts Baring, Hutton, and Playfair, which lie on the southern side of the lake. Another and more easterly branch appears to flow through a deep gorge between Mounts Franklin and Humboldt, in a nearly northerly direction. If my eye (assisted by a glass) did not deceive me as I looked from the highest summit of Mount Murchison, a lake, with almost perpendicular walls on three sides, forms the cradle of this last-mentioned mountain stream. These two streams unite in the Tiraumea plains, where they are joined by another smaller stream, flowing from the north, and conveying from one side a part of the waters of Mount Murchison, and from the other those from the southern slopes of Mount Maclean, and from the northern slopes of Mounts Baring and Playfair. The river, after the junction of these three streams, turns suddenly towards the west, and after a winding course of nearly seven miles, unites with the Buller a little above the Mataki-taki plains.

The next and principal tributary of the Buller is the Mataki-taki; its two more northerly branches flow from Mount Humboldt, whilst its furthest source lies near Mount Una, the water of the latter flowing in a southerly direction through the longitudinal fissure before mentioned, in which it is joined by the two northerly branches, and then runs through a large valley, which extends to the banks of the Buller, and is known as the Mataki-taki plains. The fall of the main stream from its source to its junction with the Mataki-taki, as will be seen by the tables of altitudes, is enormous, and it will readily be understood that to cross it, even at the few places where the water is shallow, is attended with no little exertion. The next tributary of the

Buller is the Maruia, the sources of which are also in the Spencer mountains, near the head of the Mataki-taki; but instead of following, like the former, a northerly course, it turns towards the south-south-west, breaks through the slaty ridges of the western chains, and, after flowing to the westward for seven miles, enters a deep gorge, called by the Maories the Kopi-o-kai Tangata, or Cannibals' Gorge.

The river, leaving this wild country, turns towards the north, and enters the Maruia plains, formed of several terraces, rising one above the other, to a total altitude of 250 feet, with an average breadth of two miles, and covered with grass and occasional scrub. For a distance of thirteen miles the river meanders through this smiling district, which is surrounded by serrated mountain chains, and receives at its northern extremity the Warwick, a tributary of about equal size, conveying the waters from the chains lying to the eastward. Leaving the plains, the river again becomes confined between the hills, through which its course is extremely serpentine, vexing enough to the explorer who follows its course, and who, after some miles of heavy walking through dense bush, finds that he has only made a few hundred yards of direct headway. The river washes the foot of Mount Mantell, a rocky isolated mountain mass, 6,000 feet high, at the eastern foot of which flows the Mataki-taki. The last-described river is the last which conveys water from the Spencer mountains to the Buller.

On the southern slopes of this wild Alpine stack we find the principal sources of the Grey, or Pohaturoha; on its north-east side the sources of the Wairau; on its eastern, those of the Acheron and Clarence, and in the deep recesses of these snow-clad giants, those of the Waiau-ua or Dillon; so that we may say that, with the exception of the Takaka and Aorere, which fall into Massacre Bay, the Wangapeka and Motueka, which run into Blind Bay, and the Karamea and other smaller streams, which reach the sea on the West Coast to the north of the Buller, all the rivers of any size on the northern part of this island take their rise in this magnificent chain.

I have already alluded to the high rocky ranges which lie in the same latitude as Nelson, from which the River Owen takes its rise. This chain consists of a large mass of rocky peaks, from 6,000 to 7,500 feet high, partly isolated, and partly connected with each other by lower ridges. As the principal object of my mission was the exploration of the Grey district, and these ranges could be much better explored from Nelson, whence they are easily reached, I could only mark their boundaries towards the Buller. Unfortunately, from both the mountains near them which I ascended, the view in their direction was very much closed in, from Mount Murchison by the rugged masses of Mount Owen, and from Mount Francis by the higher ridges of Mount Newton.

The general features of these chains, named by Mr. James Mackay the Marino ranges, are similar to those of Mount Owen and Mount Mantell, which form their isolated extension towards the south, constituting an assemblage of rugged peaks of all possible forms and shapes, and retaining patches of snow in their deep crevices during the whole year. The main river flowing from this chain towards the south is the Matiri, not inferior in size, if not even larger, than the Mataki-taki. On the banks of both of these rivers we found large tracts of level land, principally covered with valuable pine forests. The Matiri, about six to eight miles above its junction with the Buller, forks, one branch running near the western base of Mount Owen, having its source in the eastern part of the range, the other, and larger branch, flowing from the northward for fourteen to fifteen miles, out of a deep gorge. A third branch skirts the eastern flanks of the Lyell range, and seems to flow from a remarkable opening between the Marino and Lyell ranges, of which I shall speak in the sequel. As a large open space between these ranges is visible from Mount Murchison in a north-westerly direction, it will probably be there that the lake, described by the natives from tradition, lies, bathing the southern foot of this unknown mountain region.

In the preceding pages I have treated principally of the ranges, upheaved on the eastern side of the meridional fissure. These ranges, from below the point at which the waters of the Grey or Pohaturoha river have their sources, become much lower in elevation, and broken in their ridges, and before falling to the level of the Hurunui, the southern boundary of this province, present only three large and apparently isolated mountains, rising over these lower ranges to an altitude of 7,500 to 8,000 feet, and called by the first explorers Plinlimmon, Skiddaw (Wakarewa), and Helvellyn (Tekoa). I shall now proceed to describe the western ranges, which rise near Cape Farewell, and stretch in a southerly direction through the whole province of Nelson. The highest and broadest part of this range occurs near the sources of the Taramakau, close to the southern boundary of this province, its peaks there rising to an altitude of more than 8,000 feet. The general elevation of the western part of these chains, which are in fact a continuation of the Lyell range, is pretty uniform. The mountains rise like a wall from the Grey plains to an average height of 6,000 to 6,500 feet, and have in their front a series of lower, densely wooded, and dome-shaped granitic hills, which are isolated by streams flowing nearly round them from the higher range. These central mountains have bold distinct forms, and attain in their highest needle-shaped or pyramidical peaks, in the Victoria range, at the western side of the Maruia plains, to an altitude of 7,500 feet. The eastern part of this mountain system consists of several parallel chains, attaining to a height of 6,000 to 6,500 feet on the south of the Buller, whence it stretches,

broken through, however, by three large rivers, to the Hurunui and Taramakau. The interesting fact that nearly all the waters flowing from these western ranges, as well as the principal rivers rising in the Spencer mountains, fall into the sea on the West Coast, and form considerable rivers, whilst we scarcely meet any but small streams flowing from these chains towards the east, and uniting themselves with the streams running in the meridional fissure, proves that this island, as my distinguished friend Dr. F. Hochstetter first pointed out, is rising on the eastern side, and sinking on the western, the axis of equilibrium passing through its centre. In the geological part of this report I shall dwell at length on this interesting subject.

At the western side of the south and south-western continuation of the Maruia plains rises a high pyramidal mountain of the same altitude as the peaks of the Victoria range, to which Mr. J. Mackay has given my name. It is at the north-western base of this mountain that we must seek for the sources of the Inangahua, the last large tributary of the Buller before it enters the sea, and which joins the Buller about twenty miles from its mouth. The waters of the Inangahua are increased by those of the Waituhu, having its sources near the head of the Ruhu, a small stream falling into the Maruia, and of another stream which I called the Brown Grey, and which unites with the Grey where the latter enters the southern continuation of the Maruia plains, after having broken through the slaty chains at the eastern side of it. The Inangahua is further increased by the Awarau, its own most important tributary, which rises in the Victoria range, and brings down from that wild rugged nucleus of mountains, as well as from the western chain through which it breaks in its course, a very considerable body of water. Below the confluence of the Matiri and Buller, the mountains on both sides close in towards the river, and form in places, where their spurs run down to the water's edge, steep and densely wooded gorges, through which the river runs in deep narrow channels. After flowing seven miles further it receives the Maruia, and, piercing through the mountain chains, forms many falls and rapids. This renders it impossible to ascend it beyond this point with a canoe, which in summer time can easily be done as far as the junction of the Inangahua. On its northern side several streams enter from the Lyell range, amongst which the most important is one which I have named the Lyell, falling into the main river eight miles west of the Maruia junction.

The valley of the Inangahua, or Oweka plains, forms part of the level country of the Grey. The open country begins near the Mokihinui, where it consists in great measure of low hillocks, and is six miles broad, running in a south-south-west direction towards the coast, where, near Lake Brunner, it becomes twenty miles broad, and consists of terraces covered with grass and scrub, and

table lands from 100 to 250 feet high, covered with forest. Through this country all the rivers, except the Inangahua, flow diagonally, the latter having a northerly course. That portion of these plains which is situated in the province of Nelson is bounded on its western side by a continuous mountain range, commencing on the northern bank of the Grey near its mouth, and stretching in the same direction as the plains themselves towards the Buller, by which it is broken through. This range, called by the natives Paparoha, is composed on both its slopes of dome-shaped mountains, from 4,000 to 5,000 feet high, between which rises a rugged chain of serrated peaks, to the height of 5,500 feet, attaining in the Buckland peaks, eight miles south of the Buller, its greatest elevation, which I estimate at from 6,500 to 6,800 feet. The same mountain chain, but lower and narrower, continues beyond the northern bank of the Buller, under the native name of Papahaua, its three highest points attaining an altitude of 3,500 feet, and terminating near the Ngakuwaho stream. Through the northern part of the opening between the Lyell range and Papahaua, several streams flow into the Buller, of which the Orikaka is the largest. From the Paparoha chain also several rivers flow, amongst which the Ohikanui and the Ohikaiti, both having their sources in the Buckland peaks, are of considerable size. Although the greatest part of the Grey plains are covered with forest, they afford to the traveller, who for many days has toiled through wooded mountain gorges, a splendid prospect, as he sees before him, bounded only by distant ranges, this fine tract of level country, destined at some not far off period to become the home of a large and busy population.

I have now to return to the sources of the Grey, which were discovered by Mr. Travers, and were afterwards more minutely examined by Messrs. Lewis and Maling, of the survey department. Mr. Lewis has drawn up a careful sketch map of this part of the country, through which I had not personally an opportunity of travelling, and has given such a description of it that I have been enabled to introduce into my topographical map the result of the explorations of these three gentlemen.

From Mount Una stretches a spur in a south-south-west direction, on the north-western side of which lie the sources of the Maruia, the waters of which skirt the ridge of the Travers peak. This peak, which rises to a considerable altitude, is a western continuation of the same ridge, and slopes abruptly on its north-western side towards the Cannibal's Gorge, through which the Maruia flows in a westerly direction. The sources of the Grey lie on both sides of this ridge. The eastern one, called by Mr. Travers the Boyle, takes its rise opposite to the sources of the Ann, one of the tributaries of the Waiau-ua, from which it is only separated by a low saddle about 400 feet high. The western one springs from some swampy ground on the western side of the

same ridge, to the southward of the Travers peak, an ascent of only 400 feet bringing the traveller from it to the Maruia. I propose to name this second branch the Lewis. After having skirted the ridge for eight to ten miles, the ridge itself then terminates, these two streams unite, and form a river of considerable size, which from this point is called Pohaturoha. Instead of continuing its south-south-west course, the river then enters the slaty mountain chains in a westerly direction, and breaks through them, its course alternating from north-north-west to west for about eight miles, after which it enters the southern continuation of the Maruia plains; it then resumes a south-west course and receives the Brown Grey, so named by me from the colour of its waters. In the gorge through which it breaks as above mentioned, the Pohaturoha receives some considerable tributaries, both from the north and south, as I judged from seeing several longitudinal valleys in the slaty chains, all of which abut upon the gorge.

We have now to return to the grassy terraces on the eastern side of the Maruia plains, which extend towards the south. From these terraces the traveller ascends, upon a scarcely perceptible gradient, to a tract of boggy ground, one swamp succeeding another, and having between them patches of stunted manuka and beech. On the highest point between the Maruia and Grey lies the most extensive tract of this swampy ground, the waters oozing from which flow sluggishly towards both sides, those of the northern feeding the Ruhu and other streams flowing from the eastern chains, and those on the southern side running into the Brown Grey. Five miles from this bog-saddle, a considerable stream, having grassy banks on both sides, flows from the north; the hills which bound it are low, and there can be little doubt that a pass into the Inangahua will be found amongst these hills, one of its main sources lying close to this depression in the chain. The stream above mentioned is that which I have named the Brown Grey, and flows from this point towards the south-south-west for three miles, receiving on both sides numerous streamlets, one of which, on its western side, passes through a deep picturesque gorge, formed by its passage through the high mountain ranges. After its junction with this stream, the Brown Grey unites with the Pohaturoha, which, divided into several branches, then enters the above-mentioned depression in the hills, and has grassy banks on both sides. This river then takes a south-westerly course for seven miles, and contains a very considerable body of water; and notwithstanding a course of several miles, during which it receives numerous tributaries, it does not appear to be materially increased until its junction with the Mawhera-iti. In these seven miles, several mountain torrents fall into the river, forming beautiful cascades, and flowing through deep channels which they have worked through the terrace land on each side of it. At this point of the river the fall is enormous, and it forms, for some miles, an almost

continuous rapid, the many rocks in its bed confining the water in deep channels, which render it unsafe to ford it. At the end of this south-westerly reach, another small river enters it from the south-south-east, flowing through a valley almost a mile broad, and draining the mountain ranges between the Ahaura and the Grey. The Grey now, instead of following the line of depression in the mountains, which continues towards the south-south-west, and stretches to the banks of the Ahaura, makes a sudden turn towards the north-north-west, and flows for five miles through a large valley, clothed on both sides with scrub and grass, offering in its course several good fords. Its direction then again changes, becoming nearly west, with only a slight tendency to the northward; the valley too becomes narrower, and the river winds between the numerous spurs which slope from the mountains on both sides. Between these spurs is a terrace about 200 feet high, which is broken through by streamlets flowing from the gullies formed by the spurs. After following this course for two miles the valley again widens, and the Alexander stream joins the Grey from the north, bringing down the greater part of the waters of the high rocky ranges which lie between the Grey and the sources of the Inangahua. This stream, which has a remarkably straight course, is separated by a narrow and low saddle from the Inangahua, and also drains in its course the two isolated mountains which here border the Grey plains, and were named by Mr. Mackay, Conical Hill and Mount Gore. The last-named one is 4,500 feet high, and the Inangahua, after having skirted its south-eastern and southern bases, then enters the plains. The Pohaturoha, on leaving the mountains, flows partly through deep precipitous gorges, and partly through open land round Black-hill, which, with the continuation of the chain to the south-west, forms the boundary range on that side of the plains.

Four miles from the Alexander stream, on a south-west course, we meet a stream from the south-east, which I named the Robinson, and which drains, to a considerable extent, the ranges between the Grey and Ahaura. On its southern side commences the rocky range named by me the Herschel mountains, distinguished by the ruggedness of their outline. The Grey, after receiving the Robinson, flows thirteen miles west-north-west, during which its bed widens, large shingle beds appear, grassy terraces replace the dense bush, and the explorer, instead of toiling through the tangled vegetation of the forest, can avail himself, by occasionally crossing over shallow rapids, of long reaches of shingle. No stream, or even rivulet of any size, enters the Grey between the Robinson and the Mawhera-iti, which latter conveys the waters from the Paparoha range. Ascending this last-mentioned stream, the brown coloured waters of which show that it drains considerable tracts of swampy ground, we find that the greater part of its waters are derived from the western

range, supplied by rapid flowing streams, between which lie terraces from two to four miles broad and about 150 feet high, covered with stunted manuka and coarse grass, and which in many places are swampy and boggy. These terraces are confined to the western side of the river, for, on the eastern, low wooded hillocks appear. Twelve miles up, this river forks, then flowing through forest, with low ground on both sides, the larger branch coming from the Paparoha range, and the smaller one from a table land, the southern boundary of the Inangahua, which is about half a mile distant, and is reached by a descent of about 200 feet, and is even then a considerable stream. A mile below the confluence of the Mawhera-iti, the Grey, or Mawhera, as it is now called by the natives, receives the waters of another river, the Otututu, which, after a southerly course of seven miles, is entangled in the Paparoha range, draining the Buckland peaks and Mount Lochnagar, their southern continuation, separated from them by a deep depression in this central chain. This river also has small grassy terraces on its eastern side for five miles upwards from its junction. The Grey, after receiving these two tributaries, becomes much larger, and is very difficult to ford. It then turns towards the south-west, which course it maintains to its mouth. Whilst its western bank is covered with a dense forest vegetation, the eastern forms a terrace 150 feet high, covered with grass, and called by the natives the Ohine-taketake. These plains extend far inland, running parallel with the banks of the Ahaura, which joins the Grey eight miles below the Otututu. It is a considerable river, its waters being indeed little less in volume than those of the main river. It takes its rise in the same meridian of longitude as the Pohaturoha, in a mountain called Wakarewa by the natives, and breaks through the high slaty chains, receiving on both sides several streams. The most considerable of these is the Tutai-kuri, which has its sources near the saddle between the Taramakau and the Hurunui, and flows through the chains in a nearly northerly direction. After reaching the Grey plains, through which the Ahaura has a westerly course with a tendency towards the north, it does not receive any stream worth noticing. Its banks consist of slowly rising terraces, which at the foot of the mountains attain an altitude of 300 feet above the river bed. Some smaller streams from the westward fall into the Grey below the Ahaura, and the former now becomes so deep, that it is no longer possible to cross it on foot. On its western bank lies a table land from seventy to one hundred feet high, which, rising almost imperceptibly, stretches to the foot of the mountains. Seven miles below the Ahaura the Grey is joined by the Tawaukarito, the outlet of Lake Hochstetter, which lies in the centre of the plains, and receives its principal supply from the Werner range, a rugged mountain chain north of the Taramakau. This lake is two and a half miles long, and one and a half to two miles broad. A low line of hills, perhaps

150 feet high, rises on its northern side above the surrounding level, and runs for some miles parallel with the stream by which the waters of the lake are emptied into the Grey. About the same point another stream joins the Grey from the westward, flowing north-west and south-east, through a distinct depression in the Paparoha chain. Between the Tauwarikarito, which flows in a nearly westerly direction, and the Kotukuwakao, which discharges the waters of Lake Brunner, and which are about four miles distant from each other, is another ridge of small hills, running in a south-easterly direction through low level country, covered with valuable timber. The Kotukuwakao is a considerable stream, flowing north-west-by-north for twelve miles towards the Grey, without offering a single fording place in its whole course.

Lake Brunner is a splendid piece of water, above which, on its eastern and south-western sides, high mountains rise. It has a superficial area of twenty-four square miles, and will one day be visited for its picturesque scenery by the future settlers in the Grey plains and inhabitants of the town near the mouth of the river. This lake receives its waters from a smaller lake called Piherua by the Maories, which lies three miles distant from the former, having between them only an isolated conical mountain, round which, at its northern base, flowing through marshy ground, lies the connecting river. The Piherua itself is formed by a stream rising in the Werner range, to the foot of which this lake extends. From Lake Brunner, the Kotukuwakao, to its junction with the Grey, and the Grey thence to its mouth, form the boundary lines of the Nelson and Canterbury provinces. After the union of the two rivers, the Grey enters the gorge which it has cut through the southern slopes of the Paparoha chain, then assuming a more westerly course. Two miles lower down it leaves the gorge, the hills recede on both sides, a large triangular flat lying on its northern bank, bounded by a narrow limestone range, which rises to the height of 150 feet, near the sea coast. Five miles more bring the traveller to its mouth, where this fine river is a quarter of a mile broad, and of considerable depth.

I have now described, as far as necessary, the general physical features of the country explored by me, and I have, I think, shown, that although huge mountain chains preponderate, there are, nevertheless, some excellent and extensive valleys and plains, which must, at some not very distant day, prove useful to the European population of this province. I shall now proceed to describe the coast line from the Grey to Cape Farewell, along which, with the exception of a few miles, where perpendicular cliffs jutting into the sea would not permit me to pass round them, I have travelled the whole way. I may here state that the bad reputation which the west coast of this island had gained, of being,

amongst other disadvantages, exposed to very heavy seas, is in many respects unfounded. At the mouth of the Grey, as well as at that of the Buller, at both of which we experienced heavy gales from all quarters, the breakers on the bar were not so high as I should have expected, nor did they extend any great distance seaward, but few lines of breakers being visible. I am, in fact, satisfied that the mouths of the Grey and Buller may both be taken in moderate weather by large vessels and steamers, as well as by small coasting vessels.

Before, however, commencing the description of the physical features of the coast line, it is necessary to state in what manner I have prepared the topographical map which accompanies this report. I was furnished by the survey department with a map, which contained, at my own request, a delineation of such tracts of the province as had been actually surveyed. I found upon it a coast line from West Wanganui, round Cape Farewell to Wakapuaka, my last station, the course of the Wairau, the eastern country round Lake Tennyson, and the northern end of Lake Roto-iti, and its outlet as far as the Devil's Grip; and, as Mr. John Rochfort had finished his extensive survey on the West Coast, I was enabled to take advantage of it also in preparing my map. In order to understand what I have to say in the sequel, it may be as well to mention that Mr. Rochfort's survey began at the southern boundary of this province, at the Hurunui peak, the position of which had been fixed by triangulation from the Canterbury survey, the real position of Christchurch, the starting point of the trigonometrical survey, having been previously accurately determined by numerous astronomical observations. Continuing thence, by Lake Sumner, to the sources of the Hurunui, he surveyed across the pass, and down the Taramakau, which rises on the other side, to the south bank of Lake Brunner, upon which he continued until he reached the Kotukuwakao, the outlet of the lake, which he followed to its junction with the Grey, and thence to the mouth of the last named river. Thence he surveyed up the coast as far as the Ngakuwaho stream, which lies seventeen miles north of the Buller. He also worked up the Grey to its junction with the Mawhera-iti, and followed the latter stream up to the Inangahua, so reaching the Buller. This river had been previously surveyed by him, to within a mile and a half from its junction with the Maruia. As the numerous ranges and peaks in the country through which I travelled afforded me good opportunities of fixing, by means of magnetic bearings, the general features of the north-western part of this island, including the coast line from the Ngakuwaho to West Wanganui, I can with confidence lay before you the result of my labours, in which I have been well assisted by Mr. James Burnett. Although I had a pocket sextant with me, I thought it useless to make any observations for the positions of the mouths of the Grey and

Buller, seeing that in the tables of positions in the New Zealand Pilot, those points, with some others between the Grey and Cape Farewell, are laid down in degrees, minutes, and seconds. In preparing my map I was therefore not a little surprised at finding great differences between the results of the survey of Mr. Rochfort, who started from a well fixed point, and the tables of positions in the New Zealand Pilot.

In order that you may judge for yourself, I here place both results in juxtaposition.

TABLES OF POSITION.

		New Zealand Pilot.		Mr. Rochfort's Survey.	
Place.	Particular Spot.	Lat. S.	Long. E.	Lat. S.	Long. E.
		d. m. s.	d. m. s.	d. m. s.	d. m. s.
Grey River	Entrance	42 28 30	171 11 15	42 23 45	171 11 40
Perpendicular Point	Centre Cliff	42 8	171 19	42* 3 5	171 15 25
Cape Foulwind	Extreme	41 45 30	171 34 30	41 43 5	171 28 30
Three Steeples	Northern	41 43 20	171 35 15	41 41	171 30
Buller	Entrance	41 46 15	171 45	41 42 20	171 36 20

* I took the extreme of the Miko Cliffs.

As it may be expected that within a short time the Grey and Buller rivers will be frequently visited by vessels, it is of the greatest importance to ascertain where the error lies. I may add, that my own bearings and observations accord very closely with Mr. Rochfort's survey, and I believe they will be found correct, principally for the following reason. The three peaks of Mount Murchison, which are visible from Nelson, are also visible from the mountains above the Buller, near its mouth. I had an opportunity of fixing the position of these three peaks from the mountain itself, looking towards Nelson as well as towards Lake Roto-iti and the adjacent mountain peaks, the positions of which I had before ascertained from the shores of the lake. I found their positions accord with my previous observations from all these points, as well as from two mountain peaks near the mouth of the Buller, which I ascended. On my return to Nelson, being anxious to check these bearings, I took them once more from two fresh points, and obtained a similar result, which would have been impossible had the positions of the Buller, Cape Foulwind, Omu Point, and Black Reef (or Northern Steeple) been inaccurately laid down in Mr. Rochfort's survey of the coast line. A great number of barometric observations, many of them in conjunction with the results obtained by the boiling

water apparatus, have enabled me to give, in the accompanying table, the altitudes of many of the principal points over which I passed. I am indebted to Captain Rough and Mr. Christopher Maling for making, during my absence from Nelson, careful meteorological observations, which have assisted me in calculating with accuracy the tables in question.

Between the mouth of the Grey and the Waimatuku stream, the country is more level, and we found near the sea, between it and the foot of the Paparoha chain, a low limestone range of 100 to 150 feet high, forming a bold headland in the Komatiki-tawao cliffs, against which the waves break with great fury. A mile north of the Waimatuku, the spurs of the carboniferous range, which I have called the Davy mountains, reach the sea, and leave very little space between low water mark and their rocky walls. At Maukurinui point we meet the central part of that range, which here slopes down, presenting in its rugged outlines a picture of wild grandeur very difficult to describe. North of the many promontories jutting from this range lies a sandy beach, nine miles long, and intersected by many streams. The central range which rises at the head of the Okiwi and stretches thence in a straight course from north-north-east to south-south-west, is visible over some rugged limestone hills, which run about a mile inland towards the Pororari and reach the sea at the Punakaiki cliffs, known to the explorer for their dangerous ascent and for the caves on their northern side. Thence to the ascent of the Tuhinu, a distance of eleven miles, the coast is a continuous line of hills from 400 to 600 feet high, lying close to the shore and rising to the height of 1,000 feet further inland. Amongst these the Miko cliffs, where the traveller from the south has to descend perpendicular limestone walls for about sixty feet on ladders, are the best known. Here and there granitic hills reach the coast, and the rock, presenting occasionally a cuboidal structure, gives a new character to the scenery. The limestone and green sand cliffs, which principally constitute this part of the coast, are distinguished by the regularity of their stratification, which, from a distance, gives to their bold escarpments a ribbon-like appearance. At the foot of the Tuhinu, a continuation of these hills, which in many places are swampy, and covered with grass and rushes, with here and there a belt of forest, the coast becomes so rough, and the cliffs so steep, that the native track follows the ridge. The character of the country remains still the same, hills from 600 to 1,000 feet high, lie inland, running parallel with the high central chain, one range succeeding another, and each sloping abruptly towards the west. The numerous streams and rivulets which pass through them on their course from the rocky mountains have worked deep beds through the more westerly ranges, which at the Potikohua retire from the coast, and run parallel with the Buckland peaks.

The Waitakere is a nice stream, to whose banks the path from the Tuhinu descends. The mouth of this river offers good anchorage for small craft, but I do not know whether the bar will permit it to be entered. At the northern side of this stream a small belt of forest separates it from extensive terraces, covered with grass and rushes, which commence here, and which are fringed on the coast line and on the margins of the intersecting streams by strips of forest. These terraces stretch across the Buller to the Waimangaroha stream, and are in fact the delta of the Buller, accumulated during successive ages. The coast line from the Waitakere to Tauranga is nearly straight, and consists, for nine miles, of a splendid sandy beach, upon which the Totara and the Okari, two considerable streams which drain the Buckland peaks, empty themselves. Tauranga is a small rocky projection, which has been united to the main land by an accumulation of drift-sand, forming small hillocks behind it, and extending for several miles towards the south, near the coast; contrasting greatly with the wild scenery of rocks and promontories further down. Although some picturesque rocks occur between Tauranga and Omu Point, bordering the sea, and protecting the loose alluvial formation within against encroachment by the waves, the country still continues of the same character; that is to say, a terraced table land, from sixty to 150 feet high, which, near the Buller, descends to its level in successive terraces, from ten to fifty feet high. The Buller, or Kawatiri river, of which I have already treated, has a better entrance than the Grey, although its waters are shallower over the bar, being, as I have been told, only four feet deep at dead low water. A deep lagoon, of some extent, on its southern bank, offers a safe anchorage for vessels. The level terraced country on the banks of this river extends from six to seven miles inland, and will one day be found useful as an agricultural district, should either the gold fields of the middle Buller, or the extensive coal-fields on its northern bank, induce a European population to settle there.

Advancing towards Cape Farewell, the level land contracts, the Papahaua range approaching the coast. About ten miles north of the Buller the level country ceases entirely, the spurs from Mount Frederic falling to the water's edge. Behind the Ngakuwaho stream, which drains part of the southern slopes of the Papahaua chain, is a good sandy beach. Here again the hills are low, and have between them broad valleys, covered with luxuriant forest, and intersected by small streams. Above them tower the snowy peaks of the Lyell range, the western base of which is five miles distant from the mouth of the Mokihinui, a stream of considerable size, which drains a large extent of country, and derives its waters principally from the northern slopes of those mountains. From the Mokihinui to the Wanganui river, a distance of twelve miles, the coast has similar features to those

near the Miko cliffs. Granitic cliffs and promontories, many of them formed by the huge boulders brought down by the numerous mountain torrents which here reach the sea through deep gorges, alternating with limestone cliffs, of which some, like the Bluffs of the Otahu, reach an altitude of 700 to 800 feet, and offer nearly perpendicular faces to the foaming surf, presenting, far away from the seaward, the appearance of remarkable fissures. Here the journey must be performed rapidly, to avoid being caught by the rising tide, it being, in many places, only possible to pass at dead low water. At the Wanganui river, the southern branch of which comes from the Lyell range, we again meet with level land, consisting of terraces, covered partly with valuable timber, and partly with rushes and swamp grass. This low tract of country continues for twelve miles to the north, and at its southern part is from six to seven miles broad, narrowing where the Karamea enters the sea. The Karamea plains are watered by the rivers Wanganui, Otumahaua, Karamea, and Oparara, and offer a fine spot for settlement. The high rocky mountain chain, of an average altitude of 6,000 feet, forming the Tasman mountains, a continuation of the Lyell range, show themselves above the low land in the foreground, running in a northerly direction towards Mount Domett, a gigantic snowy pyramid, in which lie the sources of the western branch of the Karamea, of the Haihai, of the southern branch of the Wakapoai, and of the Aorere, the waters of which fall into Golden or Massacre Bay. The Lyell range has been laterally dislocated at its northern end, and a valley, containing low granitic hills, lies between it and the Tasman mountains, trending towards the Matiri. Through this dislocation I have no doubt that an easy pass will be found from the Karamea plains to the Matakitaki plains on the banks of the Buller.

The Tasman mountains are broken through by many rivers and streams, which run with great velocity towards the coast, and some of which flow through deep and frightful gorges. The sources of the Karamea, the most considerable river north of the Buller, will probably be found near those of the Takaka, and may even extend into the western slopes of Mount Arthur, and thus lie near the head-waters of the Wangapeka, which, after joining the Motueka, falls into Blind Bay. From the great body of water which it carries, it must drain a considerable part of that unknown country. Five miles south of the Haihai, limestone ranges again occur, and thence to the Ihua-tuaroa point, with the exception of the Wakapoai valley, there are scarcely ten acres of level land, wild precipitous cliffs forming the only boundary to the foaming sea. The valley of the Wakapoai, if brought into connection with Collingwood, would offer an excellent situation for a small settlement; but it has yet to be proved whether small coasting craft can enter its mouth in safety.

From Ihua-tuaroa point, where a lower country and sandy

beach replace the huge rocks over which we had wearily dragged for several days, we found, on our way to Cape Farewell, several good sized streams flowing in a northerly direction from the granitic and slaty mountains left behind at Kaurangi point. Cretaceous hills again appear, between which, near the coast, lie hillocks of drift-sand, the former lying at the western base of the Whakamarama range, which itself forms the western boundary of the Aorere valley, and attains in the Haidinger peak, its greatest elevation of about 4,000 feet. This range terminates near Pakawau, and it is here that the cretaceous hills, which, south of the West Wanganui inlet, attain an altitude of 1,000 feet, and strike across the island, only broken through in that interval by the marshy valley of the Mangamangarakau which forms the southern arm of the inlet, reach the east coast, covering the country to Cape Farewell, and presenting the same physical character as the previous limestone country, deep gullies and steep hills, often with perpendicular cliffs on both sides, and which at Cape Farewell are still 500 feet high.

As my distinguished friend Dr. Hochstetter has already treated of the formation of the sand-spit which commences at this cape, I shall not offer any remarks upon this interesting phenomenon, which, from the summit of Cape Farewell, offers so striking an object to the eye of the observer.

TABLES OF ALTITUDES.

The numbers marked with a * are the results of observations obtained both with the aneroid barometer and with the boiling water apparatus.

	FEET.
* Brook-street-hill, near Nelson	2,441
Fox-hill	263
Saddle between Wai-iti and Motueka valleys	1,174
Mr. Hooker's station in Motueka valley	879
Saddle between Rainy river and Lake-house valley	2,324
* Lake-house	1,589
* Lake Roto-iti	1,881
Mount Robert, northern plateau, above lake	4,722
* Mount Robert, summit	6,144
Junction of Howard with Roto-iti river	1,419
Summit of hill between Howard and Lake Roto-roa	3,415
* Lake Roto-roa	1,623
Mount Maclean	3,688
Mount Murchison, north-western summit	4,672
* ,, south-eastern summit	4,843
Saddle between Leader creek and sources of Mangles	2,329
Tiraumea plains	1,124
* Junction of the Roto-iti and Roto-roa rivers, forming the Buller	1,127
* Junction of the Mangles with the Buller	509
* Junction of the Mataki-taki with the Buller	427
Mount Francis	2,135
* Junction of the Maruia with the Buller	334
* Centre of the Maruia plains	1,321

	FEET.
Bog saddle between the Maruia and the Grey	1,623
Point at which the Grey enters the depression	1,276
Junction of the Alexander stream with the Grey	841
* Deception-hill	4,313
* Black-hill	4,605
* Junction of the Mawhera-iti with the Grey	488
Junction of the Ahaura with the Grey	317
Saddle between the Mawhera-iti and Inangahua	1,127
Coal-field of the Grey, near the river, main seam	83
Tuhinu-hill	756
PAPAHAUA RANGE.	
* Mount Rochfort, highest summit	3,572
* Mount William, ditto ditto	3,611
* Coalbrook Dale, on plateau	1,914
Otahu-hill, southern bank of Tunipohu	1,067

CHAPTER III.

GEOLOGY.

Having treated, in the preceding part of this report, of the physical features of the districts traversed by me, I shall now proceed to consider the geological relations of the different mountain chains, both in regard to their age and lithological character, and also of the younger formations lying at their bases. In doing this I shall again adopt Lake Roto-iti, where I began my field work, as my starting point. One mile and a-half from this lake, on the northern bank of the stream by which it discharges itself, we observe a conical hill, which stands about 500 feet above the terraced valley at its foot; I could also trace a continuation of the mountain on the southern side of the stream, where also the valley narrowed very much. This conical hill consists of a granitoid rock, a true syenite, but in structure coarser than the syenite of Wakapuaka, near Nelson. On its eastern and western sides metamorphic rocks are exposed, consisting of dioritic schists, with veins of epidosite; on the eastern side of the hill, whence I followed them, to the northern end of the lake, these schists are changed into quartzose schists.

As far as the dense covering of drift formation with which this part of the country is encumbered would permit, I observed that the direction of the plutonic rock was parallel with the high rocky chain at its eastern side, ceasing however before it reached the northern shores of Lake Roto-roa. These eastern chains, which I ascended in Mount Robert, exhibit the character of true sedimentary rocks. More towards the west, the overlying strata consist of very compact arenaceous sandstones of different colours, principally of bluish grey, and occasionally clear and dark olive green, dull reddish brown, and blackish, alternating with a compact conglomerate in a hard siliceous matrix, the latter in general composed of pieces of clay slates, cherts, quartz, hornstones, and epidosites, but without any signs of granites or gneiss amongst them. This conglomerate changes again into a homogeneous sandstone, in which only angular pieces of clay slate of different sizes are sometimes imbedded.

All these beds are very much disturbed, and are intersected by

slaty cleavage, which passes through them at a considerable angle to the planes of stratification. Their general strike (with a dip of 75 degrees to 85 degrees towards the west) is north and south. More towards the axis of the chain we meet with blackish, blue, and greyish clay slates, which underlie these sandstones and conglomerates. I was unable, notwithstanding the greatest exertions, to find any sign of fossils in these rocks, the sandstones of which have the character of a true greywake, so that it is impossible at present to assign to them their geological age, which, therefore, must be left to the future, when more time can be devoted to a minute search amongst these apparently oldest of the sedimentary rocks.

Leaving Lake Roto-iti, and following its outlet, I observed that the river bed had worked its way through a large accumulation of the great drift, or boulder formation, lying in places 500 feet high above the river bed, and forming occasionally not less than eight terraces of different relative heights, and of which the uppermost is the highest. In these deposits (till) we find the debris of the ranges on both sides, plutonic, eruptive, metamorphic, and sedimentary rocks, imbedded in loam and gravel, and exhibiting now and then somewhat rough lines of stratification. The pieces, some of them of very large size, are partly rounded and partly angular, showing that they have not been transported by rivers, but rather by icebergs or glaciers, according to the now generally received and ingenious theory on this subject. It is striking, indeed, that in the Northern Island of New Zealand we do not meet with this formation, which therefore here, as in South America, is not found to the northward of the 41st degree of south latitude.

Having only time for a cursory examination, I was not so fortunate as to find any fossils, but I am convinced that, upon closer examination, they will (although generally very rare) be found in this large mass of detritus, which extends as far as Nelson, and there forms, at the eastern side of the harbour, hills attaining to an altitude of several hundred feet. The declivities of these hills slope abruptly to the sea, and have, as a base, a greenish clay marl, in which a few small seams of lignite exist.

On examining the country around the lake, I was much struck with a large level opening towards the north, in which, upon a careful view, I found the remains of terraces stretching towards the opening in the eastern chain, which leads to the Wairau, and is commonly known as Cotterell's, or the old pass. I was unable to follow this opening, it not coming within my field of observation.

Upon examining the Roto-iti valley towards the west, where, near the conical hill, it narrows very much, I found that the terraces on the western side of the hill did not at all correspond in appearance with the excavations made by the waters in the

drift formation on its eastern side. There it appeared that the lake itself had once extended as far as the conical hill, which formed, whilst still connected with its southern continuation, a natural barrier for the waters. It was therefore evident, from these observations, that the outlet of the lake in former times was towards the east, through the Wairau pass, in the deep depression in the eastern chain. It was without doubt in consequence of one of the great changes in the axis of the island, the downward motion of which was towards the west, that the river could no longer find a passage through this now upheaved depression, and that the waters of the lake, after having risen to a considerably higher level, flowed over the barrier formed by the crystalline rocks on its western side, and, uniting with the Howard, took the course of that river, which had probably already forced its way through the Devil's Grip.

I shall have ample opportunity of elucidating the interesting subject of the great changes in the level of the country within (geologically speaking) recent times, of which so many conclusive proofs lie before the eye of the investigator.

The great drift formation is found running from the lake along the banks of its outlet to the junction of the latter with the Howard. Here we enter upon the granitic zone, which extends, with only the interruptions of which I shall speak in the sequel, to Mount Murchison, in which it attains its greatest altitude. This granite is the ordinary compound of quartz, feldspar, and mica, and is generally of a white colour. It is everywhere associated with amphibolites, round which the granite lies, and very striking changes occur at the point of contact of these two rocks, of which an interesting section is found in the perpendicular cliffs on the banks of the Howard, half a mile above the junction of that river with the Roto-iti outlet. About a hundred yards from the line of contact, the granite becomes hornblendic, and much darker, and sends into the amphibolite rock numerous veins, which gradually thin out to the breadth of an inch, and become more finely grained. The green lustry hornblende schist near the contact is without any stratification, the whole rock consisting apparently of interwoven crystals of hornblende. Receding from the granite, these crystals become much smaller, and the feldspathic parts, with grains of quartz equal to them in quantity, assume an appearance of coarse stratification.

It may be as well here to state that, owing to the great masses of the drift formation, or alluvium, which almost everywhere cover the surface of the ground, added to the luxuriant growth of vegetation, which we find undiminished to the very tops of mountains 3,500 to 4,000 feet high, it is often extremely difficult to obtain a section, except by descending into the gorges of the rivers, which I found rather a difficult task, owing to the deep water and almost vertical banks, or by ascending to the high rocky mountain tops,

which involved a great loss of time. If, therefore, I have been unable to obtain more extended results than those detailed in this report, it must not be attributed to want of energy or perseverance on my part, but solely to the manifold difficulties under which I laboured, and which prevented me from carrying my researches further than I have.

In the Howard, under the drift formation, small seams of lignite occur, similar to those found near Nelson; I did not see them *in situ*, but I found large pieces lying upon the shingly banks of that river, evidently brought down during heavy freshes. The granitic zone between the Howard and the western foot of Mount Murchison is ten miles broad, and as I passed across it in its whole breadth, I had an opportunity of obtaining a very good section. The amphibolite occurs, not only in small intercalated masses, but often forms mountains of considerable size, as, for instance, Mount Maclean.

Here and there I found the granite charged with needles of tourmaline, whilst in other places it was intersected by large veins of pegmalite and graphic granite, which latter was of a really beautiful structure. Mount Murchison, which I ascended, has all the characters of a true granitic mountain. On its rounded dome-shaped north-western top, rocking-stones and tables were not wanting, whilst the middle and south-eastern peaks exhibited conspicuously the great power of the atmospherilies in a country where, during part of the year, all the mountains above 4,000 feet in height are regularly covered with snow; this, partly melting during the sunny days, is often re-frozen during the nights, forming ice in the fissures of the rock, which, in their polyhedric clefts, offer ample opportunity for disruption.

The same process continues, although on a smaller scale, in others besides the winter season, the condensation of the clouds and mist creating ice, the greatest agent for the destruction of rocks, during the lower temperature of the nights. Heavy rains bring down the detritus, which has formed, by attrition upon the surface of the rocks, many deep valleys on all sides of the mountain. It is astonishing indeed to see on Mount Murchison how very narrow the ridge is which connects its various peaks, and how abruptly both sides fall for 1,500 to 2,000 feet into deep and narrow gorges, with equally abrupt and steep spurs lying between them. As such narrow ridges become more worn down every year, the formation of pyramidical peaks or needles will be easily understood. I often looked with astonishment at the small rivulets, which have worked deep and broad channels, to which their volume of water bore no apparent proportion, through or parallel with high mountain chains; and in this again we may see a convincing proof that nature, in order to produce great effects, often uses only small but continuously working means, the results obtained being far more extensive than any which would accrue

from the application, for a short time only, of the greatest hitherto experienced abyssological powers.

The action of the waters is still more visible on Mount Robert, where they have worked three large and deep valleys, running eastward from the central ridge towards the southern extremity of the Roto-iti lake. The valleys are broadest in the middle altitude of the mountain, and narrow, before they reach the lake, to mere gorges. The main ridge itself, sloping abruptly towards the west, is often so sharp as to leave merely space for one's footing. The mountain in many places is only covered with forest to an altitude of 3,000 feet, above which a barren desert begins, strewed with angular pieces of rock of all dimensions. As the agencies which have produced these effects are still carrying on their perpetual work of destruction, it is clear that no vegetation capable of giving firmness to the rubbish can spring up. The whole scenery presents, in fact, an image of utter desolation and waste, and it is only here and there, where comparatively level spots occur upon the ridge, and upon its more moderate declivities, that we find an Alpine vegetation, forming occasionally a lovely carpet of flowers, springing from the desolation around, and contrasting agreeably with the bizarre forms of the rocky points about it.

Here, again, we observe that the two mighty agencies which determine the form of the surface of our globe endeavour to counteract each other, for whilst the abyssological force upheaves or depresses, the atmospheric destroys and levels, both continuing their slow but incessant work for myriads upon myriads of years. The granite near Lake Rotoroa diminishes in extent towards the south, and a change into gneiss-granite and granulites, containing a great quantity of garnets, is traceable, between which amphibolites predominate. In the upper Mangles a vein of almost pure magnetic iron ore appears, which, with a strike nearly north and south, and a dip of 79 degrees towards the east, intersects the granite, and has a breadth of twelve to fourteen feet. At the southern side of the Roto-roa we meet with an assemblage of eruptive rocks, which have broken through the amphibolite, and which appear most conspicuously in the magnificent dome-shaped Mount Hutton, at the southern corner of the lake, composed of a beautiful red augitic porphyry.

More towards the west two other mountains of almost equal size appear, formed of diallage and hypersthene rocks, the nearest of which to Mount Hutton I called Mount Playfair, placing the name of the pupil and friend in conjunction with that of his and our great instructor. More towards the south, on the eastern side of the Spencer mountains, we find a whole series of diabasic rocks, diabases, aphanites, llerzolithes, porphyries, and amygdaloids, occasionally rising in magnificent cones over the surrounding country, of which Mount Smith, lying at the foot of Mount

Franklin, and consisting of a compact blackish green augitic porphyry, with crystals of uralite, is the most important.

The Spencer mountains themselves, which tower with their rugged peaks above all these regular cones, consist of the same sedimentary strata as the ranges east of the town of Nelson, with which they stand in the closest connection. These strata become more crystalline towards the east (their axis), exhibiting the same characters as those of the section which I obtained last year when examining the chains from Nelson over the Pelorus to Queen Charlotte Sound. The slates, which on the western side are mere clay slates, there become more crystalline, alternating with dioritic schists, and passing, near the axis, into almost crystalline micaceous clay slates, with quartz layers and veins, and have a remarkably regular strike and dip, as I observed on tracing them from Queen Charlotte Sound towards the south-west to the Kaituna pass.

I am not able at present to say in what connection the two chains on the eastern and western sides of the fissure (where they almost meet) stand to each other, as I did not travel so far; but judging by the boulders in the Maruia, where this river leaves the Cannibal's Gorge, the eruptive rocks must cease there; for, notwithstanding the most minute examination, I was unable to discover any trace of them, finding only the same sandstones and slates as before described, mixed with the detritus of the western chains, which has quite another character, and of which I shall speak in the sequel.

Before leaving the Spencer mountains, I may offer a few remarks upon their origin. We see in the longitudinal fissure, and in the mountains on both sides of it, the effects of a great disturbance in the earth's crust, but we do not see all its causes. These we have principally to seek in the Kaikoras. Unfortunately, when I last year examined the Wairau and Awatere districts, I did not find the necessary time (as the results of my field work had to be embodied in my friend Dr. Hochstetter's lecture, and his stay in New Zealand was necessarily limited) to follow the last river sufficiently far to obtain a clear insight into the structure of that magnificent mountain system; but from the boulders collected in the Awatere, it was certain that it consists partly of eruptive and partly of volcanic rocks. I speak here only of the inland Kaikoras, because, after having seen the seaward Kaikoras, although only from the deck of a steamer, I am satisfied that, like the Spencer mountains, they are composed of sedimentary strata, the chains of which they consist striking north-east and south-west, with large longitudinal valleys between them, and not having in their outline the least appearance of volcanic or eruptive origin.

It is further an important fact, that all the rivers having their sources in that district flow parallel with those chains from south-

west to north-east, without breaking through them, as is the case with the rivers on the western side of the island. It is therefore certain that all the chains, without exception, on the eastern side of the longitudinal fissure, the Spencer mountains as well as the seaward Kaikoras and their branches, both towards the north and the south, mantle round the inland Kaikoras, by which they have been upheaved; and this event occurred probably at the beginning of the tertiary period, to which I shall refer when treating of the extensive tertiary strata which cover the longitudinal fissure. In what connection the eruptive and volcanic rocks stand to each other can only be determined when these mountains are thoroughly examined by the field geologist.

Returning to the central granitic mountains, we meet, on their eastern side, to the north of the Buller, in the Owen river, a magnificent porphyritic granite, with large rose-coloured orthoklas crystals, which protrudes into the other granite in large veins. This newer granite forms, more towards the north, low round-topped hills, which lie at the foot of the older white-coloured granites. At the head of the River Owen this porphyritic granite (which played, as I shall hereafter show, such an important part in the formation of the eastern side of this island) strikes towards the north, between the rocky mountain chains on both sides of the low saddle between this river and the Wangapeka. In the eastern chain, a range of from 5,500 to 6,000 feet high, we not only find large beds of white crystalline granular marble, sometimes sacharoid, alternating with quartz schists, similar to those in the range between the Rivers Takaka and Riwaka (and also observed by Dr. Hochstetter in the gorge of the Wangapeka), but we also meet with some varieties with parallel lying mica, cipollin, and others with hornblende, &c.

Some of the limestone strata do not exhibit the same highly crystalline structure; they are more compact, and show such a variety of colours, that no doubt in future years they will be highly valued as marbles for artistical purposes. Mount Owen itself, now isolated, but in reality the southerly continuation of the dividing range between the Buller and Wangapeka valleys, consists of old clay slates of a bluish grey colour; here and there a rock occurs, a metamorphic rock of the slate formation, which shows, by its dull greenish or brownish colours, and its intricate scaly structure, that it belongs to the cornubianites. Round Mount Owen, and at the western foot of the granitic ranges, we meet with tertiary strata of large extent, forming mountains, which reach in some places to an altitude of 2,500 feet above the level of the sea. On the northern side of the Buller, as well as near Mount Murchison, and near the Tiraumea plains, these strata strike very regularly, nearly north and south, with a dip of from fifty-two to sixty-eight degrees towards the west. The same strike is also observed in the Tutaki, but both there and at its

junction with the Buller the dip is towards the east, often as great as seventy-five degrees. They consist of regular beds of coarse loose sandstones, coloured by oxide of iron. On the eastern side of the Tiraumea plains, at the Buller, they consist of regular bands, from two to three feet broad, of greyish yellowish clay-marls, alternating with firm grained ferruginous sandstones, under which large pebble-beds appear. Sometimes the sandstones are micaceous, as at the junction of the Maruia with the Buller; often they are black from carbon, when found near shales, which in some places are common. Fossils are very rare, and with the exception of a few specimens of the genus dentalium, two specimens of pecten, identical with those found in the overlying limestones of the brown coal formation at Motupipi, I found only the remains of a bivalve shell, belonging to the freshwater mollusca, and being most nearly allied to Anodonta.

Everywhere small seams of brown coal appear, of which the largest one, which I found in the Mangles, near its junction with the Buller, was three inches thick, but they all, without exception, appeared to thin out and to have been formed by driftwood, imbedded in spots fitted for its reception. In other places small patches of the same coal occur, as if formed by the carbonization of a single trunk.

I observed imbedded in sandstone, in the Buller, to the north of the junction of the Murchison, the trunk of a large tree completely silicified, but still showing distinctly the annual rings. These seams of brown coal are accompanied by many very fine impressions of dicotyledonous leaves in the sandstones and shales, and in some places the leaves are still so well preserved that they can be taken out of the rock in an almost perfect condition.

All the above cited facts prove that these deposits have been accumulated in an estuary, marine and fresh water formations probably alternating, and indicate a frequent oscillation of the level during the period of deposition. The regular succession of gritty sandstones and soft argillaceous marls, alternating with perfect regularity to a considerable altitude, proves further that these beds were deposited under re-occurring circumstances of similar character. It may have been that during heavy freshes in the rivers great quantities of sand and pebbles were brought down, and distributed upon the steep sides of hills lying beneath the waters of the estuary, and that when the freshes subsided, they only brought down mud and fine sand, which were spread over the underlying stratum; or it may have been that the direction of submarine currents was from time to time changed by the successive upheaval and depression of the shores. Whatever the cause, however, the alternation is very striking, and brings vividly before the mind of the explorer the fact that the same agencies which we observe daily in operation, worked without intermission during bygone ages, when the form of this island was entirely different.

Where the conglomerate occurs, we find that the course of the river is always contracted, because those strata, strongly cemented by an argillo-arenaceous matrix, and consisting principally of rounded masses of chert, hornstone, quartz, quartzite, jasper, sandstone, &c., have resisted much better than the soft sandstones and marls the erosion of the river. In many places we observe striking examples of the degrading force of the river current, and how frequently nature employs only small means to produce great results. In the soft sandstones and clay marls near the bed of the river, large and perfectly circular holes are found, many feet deep, and having frequently a diameter of from five to eight feet, at the bottom of which lie rounded boulders of harder rock. During the freshes these boulders are put in motion by the whirling waters, and by their attrition every year make their abode broader and deeper. This tertiary formation, which is of the same age as the Motupipi brown coal (miocene?) is not only of great extent and elevation, but has also undergone considerable changes in its stratigraphical position; for even admitting that the strata were originally deposited on the slopes of mountains beneath the sea, lying at a considerable angle, this could not have taken place at the angle of seventy-five or eighty degrees which they exhibit in some of the hills in the Tutaki. We may therefore conclude that since their deposition they have not only been upheaved vertically to their present elevation, but that at the same time they were torn and rent in various directions, as exhibited by their present positions. As no tertiary strata appear to the west of the western range, the Lyell and Brunner ranges, &c., it is evident from this and for many other reasons, that the principal waters of the estuary alluded to came from the western side of the island, in which so many interesting changes have taken place, and that it was, in fact, formerly a mere extension of Blind Bay. This tertiary formation stretches as far south as Mount Mantell, where we meet it on both sides of the Matakitaki and the Maruia; it then disappears, and no other deposits cover the outcropping plutonic and metamorphic rocks than drift and alluvium. In the Matakitaki plains we again find tertiary strata covered by a large deposit of boulders, in some places 200 feet thick, below which layers of a greenish blue clay marl are visible, between which here and there occur small seams of lignite, which gradually thin out.

I have already spoken of Mount Owen and its formation, and shall now proceed to observe upon the central chain of the island, lying on the western side of the longitudinal fissure, between it and the West Coast, and bounded on the north by the Mokihinui river, and on the west by the Grey plains. Although I traversed this chain I have not obtained such sections as I could have desired. In a few places only I found sedimentary rocks *in situ*, and the scarcity of our provisions just as we reached this central

part of the island would not permit me to stay there for the time necessary for exploring more closely the structure of these chains. By examining the angular pieces of rock brought down by the mountain torrents, I obtained, however, an insight into the formation of that wild mountain region. This central chain is flanked on its eastern side, as far south as Lake Roto-roa, by granite and gneiss granite, and has there been more denuded than on its western side, where, in the Tasman mountains, the Lyell and Brunner ranges, Mount Alexander on the southern bank of the Inangahua, and Black-hill on the southern bank of the Grey, it forms, as before described, a wall of rocky mountains from 6,000 to 6,500 feet high, striking nearly north and south. The whole chain on its western side, where I ascended Black-hill, consists of gneiss granite. In advance of this chain, and running parallel with it along the line of the Grey plains, we find conical hills and mountains, composed of a red porphyritic granite, which has protruded into the chain, many remarkable examples of which are visible. Some of these mountains reach, as for instance in Mount Gore, to a considerable altitude, and I noticed that where these hills were highest, the gneiss granite chain to the east of them also attained its greatest elevation, and became distinguished by the ruggedness of its outlines and by its needles and peaks. This granite, probably of secondary age, as I shall show when I treat of the Grey and Buller coal-fields, breaks through the central chain in all directions, but without disturbing materially its general strike. It surrounds like a framework the sedimentary rocks, which tower amongst it in rugged masses, and it is in the lines of this framework that the courses of the principal rivers which traverse the mountain chain occur; and as my route led me mainly along the river courses, it will be seen that, with a very trifling exception, I travelled entirely over granitic ground. The only point on the western side of the chain, north of the Buller, where I saw this gneiss granite *in situ*, was at the Tata Island, whilst assisting my friend Dr. Hochstetter in collecting details for the geological map prepared by him. I am not able to say whether the porphyritic granite also exists near Separation Point, but, from what I have seen of the country, I infer that it will be found at the Wangapeka, in the great break which there occurs in the chain, the hills in the gap very much resembling in form those in the Grey plains. At the head of the River Owen, it is seen protruding through the chain, and continuing in a southerly direction, flanking Mount Murchison on its western side, and is there lost sight of, being for the most part covered by tertiary deposits. On the eastern side of the Lyell range it again rises in large mountain masses, of which Mount Newton, about 4,500 feet high, lying on the right bank of the Matiri, is the highest. Thence, running in a northerly direction, in hills of smaller dimensions, it divides the Lyell range from the Tasman mountains,

and reaches the coast a few miles north of the Mokihinui river, whence, as before, it flanks the central range as far as Lake Brunner.

Although I have termed this granite porphyritic, its structure is in many places very variegated; often, as in Mount Newton, it becomes finer grained, in other places it is syenitic or hornblendic; sometimes it is dark, from an abundance of mica, and at others it presents the appearance of a true porphyry, the compounds becoming so finely grained as to assume that character, and large rose-coloured orthoklas crystals being richly scattered throughout it. The contrast between this rich coloured rock and the whitish gneiss granite in contact with it, is very striking, and I observed, that where the latter is intersected by veins of the former, the vein granite is more finely grained.

From Mount Newton a branch chain extends down the Buller, separating the stratified rocks of the Lyell and Brunner ranges, which lie on its opposite banks. Another branch chain extends towards the south between the Brunner range and Mount Mantell, and is there associated with trap and amphibolite, the latter of which, at the northern end of the Maruia plains, is of great extent. The granite reaches its greatest elevation in Mount Mueller, which rises from the Maruia plains. It also surrounds the Victoria range, and, at the point where the Ruhu enters the depression, becomes hornblendic. Continuing its course towards the south-south-west, it branches off in different directions, all, however, having a westerly trend, and between which lie the courses of the rivers Inangahua, Waituhu, and Wharau; thence it runs towards the Ahaura.

On the western side of Mount Hochstetter, the Grey leaves the main line of the depression, and follows a smaller branch, which runs north-north-west, thus uniting it with the granite masses on the western side of the range. The same granite is also found in the Grey plains, in conjunction with the metamorphic schists, and in the high granitic mountains near Lake Brunner, preserving its porphyritic structure, as I found from specimens brought to me by Mr. Rochfort. Between this granitic net work and the old gneiss granite on both sides, we find a great variety of metamorphic and sedimentary rocks. On the western side they consist of very quartzose mica schists, granulites, old clay slates, quartz schists, cherts, and very compact sandstones and conglomerates, the latter frequently composed only of angular pieces of old clayslate, cemented together by a semi-crystalline silicious matrix; the whole associated with traps, amphibolites, and dioritic porphyries. The sandstones lie towards the centre of the chain, and I obtained, at the eastern foot of the Victoria range, a good section. The strata in the mountain gorge, in which I examined them, consisted of a hard zoned silicious rock, with small veins of pegmalite. They had a strike nearly north and south, with a dip of

eighty-two degrees towards the west, and contained near the intersecting veins inchoate hornblende crystals. Higher up in the mountain range, traps and hornblendic granites occurred, as I judged from angular pieces of those rocks brought down by the torrent amongst the sandstones, cherts, and amphibolites, of which its principal gravel consists.

The continuation of Mount Mantell, on the southern banks of the Warwick, consisted, as far as I could judge from the rocks *in situ* and from pieces brought down by the mountain torrents, of a succession of highly crystalline slates. In the bed of the Maruia, where it breaks through the Cannibals' Gorge, we find, close to the depression, beautiful mica slates, chlorite schists of different colours, quartz schists, old clay slates, cornubianites, and spotted slates (fleckschiefer) with sheaf-like concretions of a blackish green substance (fahlunite?), and also greywake sandstones, green and red Maitai slates, and micaceous clayslates, alternating with small quartz layers, the latter three without doubt brought from the Spencer mountains, and identical with the rocks seen in the sections from Nelson to Queen Charlotte Sound. The rocks in the opening itself, besides granite, are hornblende and quartz schists, exhibiting the same strike and an almost vertical dip. Another interesting fact is the total absence of crystalline limestone on the western side of the central chain, or south of the Buller, on the eastern side; this zone appearing therefore to be confined to the north-eastern side, where it is so largely developed. That the Southern Alps continue to exhibit the same structure as the chains before described, has ben proved to me by the rocks collected by Mr. Rochfort on the saddle between the Hurunui and the Taramakau, and by those rocks taken from the beds of the mountain torrents which fall from Mount Cook, which Mr. J. Mackay had the kindness to bring to me on his return from the lower parts of the West Coast. Mount Cook itself consists of mica slates, chlorite and quartzose schists, as well as of graphite slates and old clayslates.

Amongst the boulders in the Grey we meet with small pieces of nephrite, the greenstone of the Maories, derived from veins in the slaty rocks, but the locality in which it is principally found to the south of the Grey is the Arahaura river. It is also found all along the coast, from Milford Haven to the Punakaiki cliffs, north of the Grey, in the boulders on the sea shore, whence magnificent specimens are obtained. The Maruia plains are of a lacustrine formation, and were evidently the bed of an old lake laid dry, partly by the accumulation of detritus brought down from the mountains, and partly by upheaval, as evidenced by the terraces on both sides of the plains. In some of the vertical sides of these terraces, formed by the action of the rapid river, which has often changed its bed, we observe deposits, consisting, near the margin of the old lake, of sand and gravel, mixed with boulders of every size,

brought down by adjacent streams, and indicating, by a difference in the size of the particles in the various layers, whether the stream by which they were deposited was at the time swollen or low. At other points, close to the mountain gorges, they exhibit the character of the delta of a torrent, consisting almost exclusively of boulders, which from year to year narrowed by their accumulation that part of the lake, whilst in its central part we meet with freshwater marls of a bluish colour. Here, as at Lake Roto-roa, I observed also that at the northern end, where the waters had to find their outlet, hornblende rocks strike across the valley, which, from their hardness, offered greater resistance to the action of water than the adjoining granitic rocks, which were more easily decomposed.

My endeavours to find fossils in the slaty rocks of this chain were not crowned with success, but, from their lithological character, we may presume that as they resemble closely the rocks of the Cambrian and Silurian age in other parts of the world, they too have been formed in those remote periods. The boulders and angular pieces in the Grey, where it enters the opening, as well as those of the Maruia itself, south of Mount Mueller, show that this depression is the eastern boundary of the granite, which from this point strikes towards the south-south-west. It is without doubt, that the thermal springs discovered by Messrs. Lewis and Maling near the banks of the Maruia, in the Cannibals' Gorge, take their rise at the line of contact of these rocks. I have laid down in the preceding pages what I was able to observe in these central ranges, and I must leave it to other geologists, when this now inhospitable country has been rendered more accessible, and therefore, when they will not labour under the same disadvantages that I did, to fill up the details of the geological map of this province, in which I could only lay down with accuracy that part of the country of which I obtained actual sections, although my successor will, I think, find that the general geological features which I have filled up, partly by induction, and partly by judging from angular pieces of rock brought down by the torrents, will not be far from correct.

On the western bank of the Alexander stream we meet, for the first time, with a sedimentary rock of newer origin than those of the central chain; an arenaceous sandstone of greenish yellow colour, with veins of quartz, striking north and south, with a dip of forty-five degrees towards the west. In a few places casts of small shells are visible, but not sufficiently distinct to enable me to form any conclusion respecting them. This sandstone overlies the gneiss granite encircling Black-hill, and reaches, in the Herschel mountains, a considerable altitude; forming, on the banks of the Grey, hills only a few hundred feet high, it has been altered in many places in the most interesting manner, of which I shall state a few instances. About a mile from the Alexander

stream, on descending the Grey, I found the sandstone ceased, and a magnificent porphyritic granite appeared, intruding its masses into that rock, affecting however but little the strike and dip previously observed. The granite itself becomes, where it penetrates the flaggy sandstone beds in tortuous veins, charged with mica, the large feldspar crystals disappearing. The sandstone beds close to the contact are altered to mica schists. Fifty yards from the line of contact I met them again, having succeeded in climbing down to the river's edge in order to obtain a view of the section. The sandstones there had a semi-crystalline appearance, the same strike and dip; the mica had disappeared from the body of the rock itself, but in the numerous joints which intersected the strata, a great quantity of mica scales were to be found, showing in a very instructive manner, that the altering powers of the granitic veins were not strong enough here to effect the same changes as they did near the immediate contact, but that they were still in sufficient vigour, where unopposed by the resistance of the compact rock, to form mica scales. Two miles lower down the Grey we meet with large masses of granulite, with garnet crystals, striking always in the same direction. The granite shows itself also in the Grey plains, forming here and there, in the river bed, low cliffs, often in contact with sedimentary rocks, which are invariably altered into granulites or micaceous schists. The formation of the Grey plains is of a very interesting nature, showing what great changes have occurred in the level of this island in (geologically speaking) recent times. In the northernmost part of these plains low cretaceous hills occur, which slope down to the northern bank of the Buller. From the Buller the whole of the plains as far south as Lake Brunner are covered with drift formation and old alluvium, the only place where cretaceous rocks, a limestone charged with mica, crop out, being in the Inangahua, at its confluence with the Buller, and for eight miles up the former river. More towards the south, in the Grey, the bed of which I examined closely, these older strata cease, and a younger tertiary formation (pliocene?) directly overlies the granite. It consists of a coarse pebble bed, cemented by an argillaceous matrix, on which reposes a stratified bluish or greyish clay, full of silvery mica scales, alternating with small seams of lignite, also full of mica, and with beds of sand. These strata reach, on the eastern side of the plains, an altitude of one hundred feet, and are there overlaid by great quantities of till.

I obtained here the following sections, taken in ascending order:—

12 feet pebble bed.
3 feet greenish clays, with scales of mica, and pieces of drift-wood changed into lignite.
2½ feet sands, composed of grains of quartz and scales of mica.
2 feet bluish clay marls, changing in their uppermost part into slate clays.

4 feet lignite, often very fissile.
3 feet slate clays.
3½ feet lignite.
4½ feet clays, gradually becoming more ferruginous, and ultimately changing into loam and drift, which last was at least forty feet thick.

The strike of these beds was from north-north-west to south-south-east, with a dip towards the east-north-east of 28 degrees.

Near the junction of the Mawhera-iti with the Grey, on the southern side of the main river, I obtained another section. Here the banks are almost vertical, exposing a section of nearly 120 feet. In the river itself we find a large stratum of clay marl, in which are also many pieces of driftwood converted into lignite. These beds, of a bluish colour, are nearly horizontal, and at one place the stump of a tree, fifteen inches in diameter, broken off about two feet above the root, stands apparently *in situ*, the roots still adhering strongly to the clay marls, so as to lead to the inference that it grew upon the spot. These beds, which rise nine feet above the level of the river, were probably deposited in a shallow estuary; they are divided at irregular intervals by horizontally-deposited layers of mica; they change insensibly into loam, which is succeeded by a large accumulation of sand, gravel, and loam, interstratified with layers of boulders, partly angular and partly rounded, and resembling very much the drift formation near Nelson.

At the western side of the Grey plains a succession of ferruginous clays, thirty feet thick, occur, over which again the drift formation appears. The rivers running through them have formed several terraces, which, near the mountains, attain an altitude of 200 feet, whilst in the central part of the plains there is only one terrace from 100 to 120 feet in height, bounding the lower grounds near the river. A glance at the geological map shows that these large tracts of level land were formed before the tertiary period, and that the Buller emptied itself into an arm of the sea, which then occupied the space now included by these plains, into which the Inangahua, the Grey, the Ahaura, &c., also discharged themselves. During the sinking of the country in the glacial period the valley was filled up, and when the island rose again, an insurmountable obstacle was probably presented to the southern flow of the Buller, partly by the accumulation of drift during that period, and partly by the depression caused by the tilting (so to speak) of the whole country from south to north. A depression in the western chain, worked out either by sea currents or by rivers descending from it, at the same time offered to the Buller its present exit for its waters. This theory is confirmed by the fact that in the Buller valley, between the Paparoha and Papahaua chains, no drift is found having the least resemblance to that seen on the banks of the river flowing through the plains.

The Paparoha chain, and its continuation to the north of the Buller (the Papahaua range), are of great practical interest, because it is amongst them that we meet with highly valuable and extensive coal-fields, of which the Grey river, shortly before it reaches the sea, has exposed a magnificent section, to the examination of which I devoted some considerable time. The Paparoha central range is surrounded by granites of very various character, and itself consists of gneiss, mica slates, eklogites, quartz schists, and sandstones, which seem to occur in the centre of the chain, the whole cut through or otherwise associated with traps, amphibolites, and dioritic porphyries.

The Davy mountains, of a younger formation, lie on the south-western side of the granite, which, near the Mico Cliffs, reaches the sea; they strike north and south, with a dip towards the east and west, forming a fold, and exhibiting near the Grey, where the range slopes down, a qua-quaversal dip. This range has been denuded in the upper part of the fold, and the strata underlying the coal-bearing formation are exposed, of which, having an opportunity of examining them on the coast, I shall speak in the sequel. It is evident that the disturbing force which threw the strata towards the west, thus forming the arch or fold, has been exercised by the granite on the eastern side of the Davy mountains, as well as by the eruptive rocks which have invaded the strata, as for instance the dioritic porphyry near the Kokiwi river.

An almost complete section of the coal-bearing and overlying strata is exposed on the banks of the Grey, of each of which the following table gives the approximative thickness only, with the exception of the coal seams, which I carefully measured.

	FT.	IN.
A. Ferruginous sandstone (grindstone) with concretions of clay ironstone	255	0
B. Clays, brown and dark grey, occasionally bluish	160	0
C. Ferruginous sandstone, like A	70	0
D. Brownish yellow clays, with mica	60	0
E. Calcareous sandstones, changing into grits, the latter with small seams of shale	120	0
F. Seven small seams of coal, from four inches to sixteen inches, with shales and micaceous grits between	9	0
G. Micaceous sandstones and grits, with small seams of coal, and trees changed into coal	21	0
H. Main seam of homogeneous pure coal at the eastern side of the fold	12	7
And at the western side	17	2
I. Grits, often very micaceous, often coloured by carbonic matter	190	0
K. Seam of impure shaly coal	4	0
L. Grits, layers of very micaceous slaty sandstones and coal, the latter probably derived from driftwood	80	0
M. Coalseam	1	2
N. Grits and shales, with some layers of mica	5	0
O. Coalseam	4	6
P. Grits and shales	15	0
Q. The last visible seam, very much cracked; thickness as far as I worked into it	12	1

The seams F and H, striking north and south on the western side, and with a dip towards the west of 11 degrees, are again visible on the eastern side of the chain, where they have the same strike, but there they dip 13 degrees towards the east. As we near the axis of the chain the dip becomes greater, and increases at the lowest visible seam from 9 degrees to 26 degrees. The main seam contains a magnificent and very compact coal, and evidently has not been so much disturbed as the seams M, O, and Q, which we meet with in the centre of the section, the last three striking east and west, with a dip towards the south of 26 degrees. The seams M and O have been cut through by the river transversely to the flexure (or bend), and their upper parts only, lying sixty feet above the river, are occasionally exposed, the remainder having been washed down, partly by rivulets flowing from the mountain, and partly by the main river during freshes. Amongst the detritus which here covers the sides of the mountains, and which is in fact only the remains of large slips, the seam Q is visible. It is very much cracked, the coal fractured and brittle, and at the same time lighter and more bituminous than that of seam H.

The coal-field, although of a more recent formation, presents exactly the same characters as those belonging to the true carboniferous period; we meet with the same shales, grits, and sandstones, and the coal itself cannot be distinguished from deposits of primary age. The larger seams have their under clays. The grits consist of quartz grains, very little rounded, with occasional crystals, and of mica and feldspar, the whole embedded in a compact silicious matrix, so that, although of pure mechanical origin, they resemble a coarse granite (arkose). In some places the mica predominates, lying in thin horizontal bands in a silicious matter, frequently coloured by carbon, together forming a beautiful rock, the contrast of the black matrix with the silvery mica being very striking. There are also some bands of pure mica, three to four inches think, which by pressure have been formed into a rock, so closely resembling a real mica slate, that it would almost be impossible to detect any distinction between them, unless its origin were known. How various and sudden must have been the alterations in the conditions of the currents of the sea, and in the level of the land, to allow of the deposition of such different strata often within a single inch of each other. The coal itself cannot be distinguished from the Newcastle coal of Australia, its structure, lustre, specific gravity, mineral composition, and combustibility being similar.

I may here give an analysis made by Mr. Tatton, of Nelson, which confirms me in the belief, originally formed on the spot, that this coal-field is of the same age as that of Newcastle, namely, the great oolite.

ANALYSIS OF THE GREY COAL, BY MR. TATTON.

No. 1.

	West Coast.	Sydney.
Carbon	74·26	74·13
Hydrogen, Nitrogen, Oxygen	25·74	25·87
	100·00	100·00

No. 2.

	Volatile Products.	Coke.	Incombustible Ash.
1000 Parts. West Coast	234	766	13 1-6
1000 Parts. Sydney	247	753	15¾

No. 3.

	Coal. oz.	Water. oz.	Reduced to oz. grs.
West Coast	10	20	9 14
Sydney	10	20	9¾ 8

The shales were very rich in impressions of plants, and I collected a great variety, which will enable the paleontologist to determine by what plants these huge coal deposits were principally formed. The greatest part are leaves of dicotyledonous plants, in a high state of preservation, and often several inches long and broad; but I found also portions of plants belonging to the families Cycadeæ, Brachyphyllum, Calamites, and Zamites. I only discovered one fern, allied to Pecopteris, and one Equisetum; and we may therefore infer that we have rather to do with the remains of extensive forests than with those of swampy or rushy grounds.

In the shales and sandstones belonging strictly to these coal measures I could not detect any fossils, but in the arenaceous limestone (or rather calcareous sandstones) overlying them I met with some exuviæ belonging to the genera Monotis and Serpula. In the clays D, I obtained a better harvest. Here I met with numerous bivalve shells from acephalous mollusks, as well as from brachiopods, amongst which the genera Monotis, Posidonomya, Inoceramus, and Terebratula occur; gastropods are also abundant, amongst which small species of Fusus and Murex were the most numerous. I found, too, a small Echinus, but unfortunately in a very fragmentary condition. The absence of cephalopods is very striking, and we may conclude from it that these strata were deposited in shallow or muddy waters not frequented by belemnites, ammonites, &c. As soon as the specimens collected by me have been described by an able paleontologist, I will make the result of this investigation known to you.

The coal-bearing strata are covered for seven miles near the coast line by cretaceous rocks, of which I shall speak after having completed the description of the former. Where these cretaceous

rocks terminate, the formation for half a mile is obscure, the country consisting of low wooded hills, covered with boulders and till. We then again reach the Davy mountains, the declivities of which slope abruptly to the sea shore, and the following strata are exposed, taken in descending order, and travelling northward: a sandy clay, whitish yellow, with concretions of clay iron-stone and iron pyrites, assuming as we advanced more the character of an argillaceous sandstone, of a reddish colour, resembling a Keuper sandstone, and being from fifty to sixty feet thick. In this sandstone I found the cast of a monotis. This was succeeded by a very compact greenish flaggy limestone, from 100 to 120 feet thick, sometimes silicious, with remains of crinoideans. Then a band of carbonaceous shale, often assuming the character of an impure coal, and about four feet thick. Below this seam lay a conglomerate, or rather a pebble bed, at least 400 feet thick, consisting of well rounded pebbles, seldom larger than the fist, of a green compact sandstone, which constituted the greater part of the conglomerate, with occasionally pieces of quartz and jasper, but without any traces of plutonic or eruptive rocks. These pebbles were embedded in a white quartzose sand, the particles of which, although not cemented, cohered strongly, and formed here and there, where free from pebbles, bands from three to four feet of a white sandstone, consisting purely of small crystals or grains of quartz. All these beds have been very much disturbed, exhibiting various large faults, by which the strata have been dislocated vertically for at least 200 feet.

At the mouth of the Wai-a-whenua this conglomerate predominates. In the bed of the river I found grit, shale, and pieces of coal, which, on ascending the river for some distance, became more frequent and angular. It was evident that the coal-bearing strata, which near the sea had been denuded, still existed here, forming, about a mile up the river, where the mountain began to rise considerably, very steep walls; but my time was too limited to permit of my ascending further to examine them.

From this point to Maukurinui, lying in the centre of the Davy mountains, a distance of three to four miles, the strata were very much disturbed, exhibiting numerous flexures and faults, so that it required the greatest care to reduce into order their apparently confused condition. The strata below the above described conglomerate, consisted of a sandstone, in stripes, from a foot to sixteen inches thick, of a greenish and bluish grey colour, the green being arenaceous and the others argillaceous, giving to the rock a ribbon-like appearance. Amongst these bands appeared now and then small beds of conglomerate, with pieces of drift-wood changed into coal; total thickness, several hundred feet. A bluish clay slate, with slaty cleavage, twenty-five feet, underlaid by a very compact sandstone, which, in its upper part, is of a more greenish colour. Towards the centre of the chain

this sandstone becomes more silicious, and of a blackish blue colour, and is in some places flaggy, whilst in others the stratification is only indicated by the different colours of the deposits. All these rocks are intersected by joints. At the lowest visible part of these strata (at Maukurinui point), the sandstone is traversed by large quartz veins. It has been described by a former explorer as basalt, he mistaking the joints, coupled with the great dip of the strata, for a columnar structure.

At this bold point, whilst climbing up the steep side of the cliff, I found impressions of fossil fishes in the rock, but as the native urged me not to lose a minute, the tide then flowing fast, and being likely to jam us for the night amongst these vertical cliffs, I was obliged, to my great annoyance, to leave the spot, which would, had I found time to secure some of these rare fossil remains, have thrown much light upon this interesting formation. It would be needless to give the strike and dip of all the strata, as they change very often, sometimes becoming almost vertical, and sometimes appearing to have been overthrown, but I shall give a general outline of them.

At the Wai-a-whènua, south of the Maukurinui point, they strike from south-east to north-west, with a dip towards the south-west of 11 degrees, rising to 45 degrees near Kararoa. Near the Maukurinui they strike north-east and south-west, with a dip of 53 degrees towards the north-west. Half a mile north of the last-named promontory the mountains recede, and I did not again obtain a section until near the Kokiwi, where I met with masses of dioritic porphyry protruding through the chain, which, with the lateral dislocation, accounts for all these disturbances. Half a mile east of the mouth of the Grey, we meet with a succession of small limestone hills, which run nearly parallel with the coast, gradually approaching the sea, which they reach in the wild headland called Komatiki-tawhao. The strata in these hills, with a strike nearly north and south, and a dip of 35 degrees towards the west, exhibit all the characters of true upper cretaceous rocks, although we do not meet with any deposits resembling chalk.

Commencing in descending order, we first meet with flaggy beds, greensands, full of long rounded branching concretions, sometimes flattening towards the end, and often entangled with each other, and which without doubt are casts of fucoids (kelp). Besides Cardium and a Terebratula, I found a large Pecten and a Cyprina, and many Echinoderms, amongst which I collected a magnificent Cidaris, and several specimens allied to Spatangus and Toxaster. This greensand is underlaid by bluish grey chalk marls, 250 feet thick, with bands of compact pale yellowish limestone, which, being harder than the chalk marl, has better resisted the action of the waves, and everywhere projects from the body of the rock. For the first 120 feet, in a descending order, these

limestone bands are only one to one and a-half feet thick, whilst the intervening chalk marl strata have an average breadth of six feet; but in the next 130 feet the bands become broader and the chalk marl less wide, the limestone constituting below these the whole rock. The limestone too becomes more sandy, and is sometimes charged with small fragments of coal, probably derived from the detritus of the Davy mountains. The same fossils as before enumerated continue to be numerous, as well as the remains of a crustacean (a crab), pieces of coral, a large Lima, a large fossil allied to Exogyra, another allied to Crania, and numerous Serpulæ.

This formation, which ceases when the Davy mountains, upon which it lies unconformably, approach the coast, again appears at the Punakaiki cliffs. Here it consists of greensands full of glauconitic grains, but without any signs of stratification, the colours, greenish and darkish yellow, being the only lines of demarcation between the various deposits. These greensands are from 100 to 120 feet thick, and are underlaid by arenaceous flaggy limestones, with a regular strike from west-north-west to east-south-east, and a dip of 17 degrees towards the west-south-west. Below these again, on the southern bank of the Pororari, a white crystalline tabular limestone appears, consisting of small fragments of shells, corals, and Foraminiferæ, with glauconitic grains, forming castle-like walls, arches, and towers, and presenting magnificent scenery. Below these we meet with dark marls, often very argillaceous, between which small flaggy beds of the above-described limestone lie. Here I first found large fossil oysters and Scalariæ, as well as the greater part of the fossils before enumerated.

These cretaceous beds continue for five miles, but for a long distance I had no opportunity of examining the rocks near the sea, having to scramble through the dense vegetation at the summit of the perpendicular cliffs. In the gullies, however, although I observed that nearly the same strike and dip continued, the underlying strata were sometimes of a nearly earthy texture, in which concretions of chalcedony were imbedded; in other places they were more argillaceous, and of a yellowish colour, with concretions of iron pyrites, but at intervals of fifteen to twenty feet small layers of white crystalline limestone occurred. Scalariæ here abounded, and I observed that the exuviæ were most numerous where the change took place from crystalline limestone to clay marl, the upper surface of the clay marl bed being literally strewed with fossil shells, amongst which large pectens predominated.

Half a mile north of the Mico Cliffs the granite begins, upon which the above formation, which is at least 1,500 feet thick, rests. As these beds lie everywhere along the West Coast directly upon the granite, we may infer that the protrusion of the latter occurred either during the cretaceous period (all the older cretaceous strata with belemnites and ammonites of the Kawhia

harbour being missing), or between the Cretaceous and Jurassic periods. The granite is here of a dark colour, and always contains large feldspar crystals, composing at times the greater portion of the rock. It continues for one mile towards the north, where this porphyritic structure disappears.

Two miles south of the Potikohua stream, the cretaceous formation again begins, but is here of a more argillaceous nature; brownish and bluish black interstratified clays, often from eighty to 100 feet thick, alternating with marls, and containing the same fossils as before, accompanied by impressions of leaves and fossil shells allied to Cyrena. Included in these beds were here and there rounded pebbles of an older limestone formation, in all probability underlying the coal formation, and full of fossils, of which I collected a good quantity. The strike of these extensive secondary strata is again nearly north and south, with a dip towards the west, varying between 9 degrees and 13 degrees. The large cave Te-ana-o-Matuku is hollowed out of granitic breccia, consisting partly of angular and partly of rounded boulders of granite, strongly cemented by granitic rubbish.

This granitic breccia projects like a wall far into the sea, becoming towards the east smaller and lower, and whilst the cretaceous rocks on its western side have been washed away, on its eastern they still exist, and amongst them we lose all traces of it. In this breccia a rough stratification is visible, striking from north-west towards south-east, with a dip of 17 degrees towards the north-east. The cave itself runs from north to south, is seventy-five paces long, ten paces broad, and thirty feet high; from the middle another smaller branch runs towards the west, which is thirty-five paces long, and the entrance of which is washed by the sea.

There is only one explanation to be given of this remarkable phenomenon, namely, that the detritus brought down by a torrent descending from a granitic mountain in the west, which has now disappeared, here entered a cretaceous sea, either in a bay or in the main sea, in which latter case the mountain probably stood on an island. The cave was afterwards excavated by the sea, which, during the slow upheaval of the present land, dashed, as it now does, furiously against the cliffs on its margin. In the bed of the river flowing near this cave, a great part of the boulders consists besides of granite gneiss and metamorphic rocks, of eklogite, a magnificent rock (consisting of grass-green smaragdite, red garnets, and silvery mica), and of grits, shales, and sandstones resembling those of the Davy mountains.

A mile further on, the hypogene rocks again reach the coast; the granites become more trappean, and have everywhere intruded into metamorphic schistose micaceous rocks (granulites and mica schists), either in large masses or in tortuous veins, affording to the observer ample opportunities for the study of the

action of intruding granite upon sedimentary strata. In many places blackish schistose concretions of various forms are included in the granite near the lines of contact, and exactly resembling the rocks of the metamorphic strata, leading to the belief that they were merely fragments of sedimentary rock embedded in the granite whilst in a soft state. These rocks form, as far as Cape Foulwind, the walls against which the sea breaks where no sand beaches occur. They are bounded towards the east, as I noticed when travelling over the Tuhinu hills, by a whitish and more finely grained granite, which, near the mouth of the Waitakere, has a gneiss-like appearance.

North of the last-named stream, some magnificent cliffs are visible, consisting of the same micaceous schist, striking from north-east to south-west, with a dip of 16 degrees towards the south-east. Through this bed run large veins of a beautiful granite, ramifying in all directions, and varying in breadth from several feet to a few inches, and consisting of very large yellowish crystals of feldspar, large hexagonal tables of silvery mica, and of translucent quartz of a vivid bluish tint. These veins are themselves intersected by straight dikes of greenstone, the whole forming the prototype of a geological section. Near Cape Foulwind, the main mass of the granite is porphyritic, and on its western side is bounded by the same micaceous schists, here almost vertical, followed near the sea by semi-crystalline sandstones. The transition from the granite to the metamorphic schists is sometimes almost imperceptible, it first becoming finely grained, and then passing by degrees into the schistose rock, so that it is at times difficult to find the line of demarcation.

Near the Potikohua river, the cretaceous formation leaves the coast, and runs towards the Paparoha chain. Between it and the crystalline rocks at the coast line a large deposit of sands occur, partly white, partly ferruginous, finely stratified, and covering the sides of low granitic hills, whose tops are seen rising above it. In these beds, in the neighbourhood of the Waitakere, deposits of lignite occur, which by former explorers have been described as coal seams.

North of Cape Foulwind, and lying upon the granite rocks, the cretaceous formation again appears, consisting of greensand, stratified clays, and limestones. Amongst the uppermost visible strata is a limestone of whitish blue colour, consisting almost entirely of corals. Between the Waitakere and the Waimangaroha lies the delta of the Buller, the changes in the course of the river as it ran through it at different periods being indicated by numerous terraces.

For several miles before reaching the Buller from Omu Point, proofs of a gradual sinking of the surface are visible, even to the superficial observer. Not only have all the trees on the margin of the forest, which here reaches the sea coast, died, but in the

tide-way itself, and even for three feet below high-water mark, we find the whole line a succession of huge dead trees, still rooted to the bottom, and presenting with their naked branches an image of utter destruction. It is impossible that they could have stood for any great length of time in such a position without having been uprooted, many of them in fact being already prostrated on the sand; and we may therefore infer that as some spots on the eastern side of this island have been raised several feet during the last few years by earthquakes, doubtless proceeding from submarine volcanic eruptions, so on the western side sudden depressions have occurred so as to submerge those forests.

It would lead me too far were I here to cite all the different data I possess concerning volcanic action and earthquakes, and the consequent change in the level of these islands, and I must therefore keep them for future publication; but I may add, that although everything I observed proves that whilst the eastern side of the island rises, the western falls, there have been occasional oscillations, as observable, for instance, between the Rivers Wanganui and Karamea. Here we find sand beds twelve feet high, with small layers of magnetic iron-sand between, upon which the sea is now continually encroaching. That these banks are not formed of drift sand is not only shown by ripple marks, and by the presence of numerous shells similar to those now existing on the sea beach, amongst which *Venus intermedia* in perfect condition is most frequent, but also by that of a large drift tree, now rotten, which lay amongst these beds. From these facts we may conclude that but a few years have elapsed since they were upraised.

In ascending the Buller, we observe, before reaching the gorge where the river enters the mountains, a succession of apparently young strata, a blue clay marl overlaid by a soft ferruginous sandstone. At the western foot of the chain, north of the Buller, the same formation also occurs; but here, between the blue clay marls and the sandstone, lie about twenty feet in thickness of black marls with mica scales. The general strike of these beds, which are 250 feet above the level of the sea, is from north-north-east to south-south-west, with a dip towards the west-north-west of 17 degrees. Above them the alluvial deposits begin. The gorge itself exhibits a syenitic granite of an even structure for several miles, through which the porphyritic granite is protruding in large veins. Greenstone dikes occur also in some spots.

This granite extends north of the Buller in a wedge-like form into the Papahaua chain, forming hills of 500 to 1,000 feet high, and ceasing in the centre of the chain. On both its sides, uniting in the centre, lie the coal-bearing strata, striking, at Mount Rochfort, regularly east and west, with a dip of 5 degrees towards the north. These strata, although of the same age as the Grey coal-fields, and consisting of the same gritty and shaly beds,

exhibit in some respect a different aspect, the soft sandy clays not occurring, and being replaced by large accumulations of conglomerates. A very striking feature is that these beds lie almost horizontally, forming near the sides of the granite wedge, vertical, and even in some places overhanging walls, from 500 to 1,500 feet in height.

These strata do not appear to have been upheaved by granite when in a soft state, but when this rock was in a solid condition, a proof of which we find near the sea, north of the Ngakuwaho stream. There large masses of porphyritic granite occur, resembling that which has protruded through the older syenitic granite. Near it we meet with a granitic breccia, consisting of large angular pieces of syenitic granite and micaceous rocks, embedded in a trappean granitic matrix, which could not have been formed by the rolling of the waves on the shore or by submarine currents, but only by friction, when the intruding masses upheaved the syenitic granite, and with it the coal-bearing strata, so that the pieces which were detached by this vertical movement became embedded in the granitic matrix. In some other places, as, for example, to the north of Mount Frederic, the porphyritic granite has itself intruded into the coal-bearing strata, and many highly interesting rocks have been formed by alteration of the grits, coals, and shales.

From the top of Mount Rochfort to the course of the Waimangaroha, which separates the last-named mountain from Mount Frederic, the general strike of the carboniferous rocks, which attain here a thickness of 3,500 feet, is from east to west, with a dip from 4 degrees to 7 degrees north. Having examined these strata somewhat closely, I am enabled to give the following table of succession, in descending order, beginning at the top of Mount Rochfort.

	FEET
Coarse grits, with small beds of fine grained sandstones	80
Conglomerate, in a matrix of white quartzose sand, consisting of rounded pebbles of quartz and quartzite	30
Ferruginous sandstone (grindstone)	6
Conglomerate	40
Sandstone, arenaceous, whitish green	8
Conglomerate, alternating with smaller beds of sandstone	200
Very micaceous grits	120
Shales	15

For the next 500 feet, the same alternating succession of grits and shales continues, as observed in the gullies round Mount Rochfort, but without any apparent indications of coal. The shales, where not too micaceous, are replete with impressions of plants, all specifically the same as those in the Grey coal-field, of which a Voltzia is here the most conspicuous. Below them again, for several hundred feet, slaty sandstones occur, succeeded by the grits and shales, amongst which I discovered a coal-seam.

In descending from Mount Rochfort, and crossing in an easterly direction the mountain plateau, intersected by innumerable streamlets, the rocky walls of which everywhere offer good sections, we again find ourselves, after having passed over all the strata before enumerated, amongst grits and shales.

Having examined at least eighty feet of these sandstones, the following strata, in descending order, are met with.

	FT.	IN.
Tabular arenaceous sandstones, occasionally containing concretions of clay ironstone	30	0
Coal seam	8	2
Shales, with small coal-seams	20	0
Grits, sometimes very micaceous, sometimes coloured by carbon	70	0

The coal seam strikes regularly from north-north-east to south-south-west, with a dip of 6 degrees west-north-west. I traced it on both sides of the valley, and followed it also in other directions, where transverse valleys have been cut through it. It has the same character as the Grey coal, as shown by the following analysis, made by Mr. Tatton at my request.

ANALYSIS.

	Buller.	Sydney.
Carbon	74·24	74·13
Hydrogen Nitrogen Oxygen	25·76	25·87
	100·00	100·00

It may be as well here to add that the analysis of both coals was made upon surface specimens, which had been exposed for probably an indefinite period, both to the action of the atmosphere and to that of water, so that we may expect, on getting into the seam, that the amount of carbon will be found to be larger.

The valley where this coal-seam occurs lies 1,914 feet above the level of the sea, and as it would be almost impossible to find it without some mark, I have placed on the nearest hill, 200 feet above it, a flagstaff, which will be visible far over the plateau.

From this flagstaff I took the following bearings:—

	D.	M.
Centre of highest summit of Mount Rochfort	236	25
Summit of Mount Frederic	11	10
Lowest saddle between the plateau and the Orikaka	61	40
Highest point of Mount William	95	45
Junction of the two streams which form the Waimangaroha	24	30
Valley where the coal-seam is exposed, about 400 yards distant	268	20

I placed also another smaller flagstaff in the valley itself where the seam occurs. I met with a seam, which is probably the same, about 150 to 200 feet above the sea, in the gorge of the Whareatea

river; but it was so much washed out and covered by the detritus from above, that I could not take any measurements, although I observed that the same succession of strata occurred there; the strike was from south-west to north-east, with a dip towards the north-west of 31 degrees. Perhaps its position here is due to a merely local disturbance. The granite in the wedge is overlaid by a green arenaceous sandstone, the lowermost rock of the carboniferous strata.

On the eastern side of the Papahaua chain, in Mount William, I again found the same strata striking regularly north-east and south-west, with a dip of 6 degrees towards the south-east.

At the western foot of Mount Rochfort no granite is to be found, but proceeding towards the north, we find it lying at the base of Mount Frederic. Here the strata overlying the granite dip towards the south-east. These carboniferous rocks cover an area of 120 square miles, and will one day be highly valuable, although at present the better position of the Grey coal-field, the thickness of its seams, and the facilities it offers for working them, more strongly recommend it to the notice of the capitalist.

A mile north of the Ngakuwaho stream the granite again makes its appearance, overlaid by young tertiary deposits. It is here syenitic, and more towards the north trappean, and changes in some places insensibly into felsite porphyry, as for instance near Kongahu Island. In other places the mica is replaced by chlorite, and large veins of the same mineral are visible, intersecting the rock. We meet also besides with many porphyritic granites containing large orthoklas crystals, and with others containing albite in greater proportion. Some of the trappean granites are full of rounded concretions of a blackish colour, and of a micaceous structure, exactly resembling the metamorphic schists which we observe near the hypogene rocks. These metamorphic rocks consist partly of micaceous schists and partly of granulites, and are intersected by occasional quartz veins. Their strike and dip are generally very irregular, although in some places, where I obtained good sections, their general strike was north and south, with a dip of sixty to eighty degrees towards the west. The cretaceous rocks which we meet with at the junction of the Inangahua and Buller extend to the coast, which they reach to the north of the Mokihinui stream. Here they consist of a flaggy, bluish, and somewhat argillaceous limestone, intersected by large veins of calcspar, and in some places full of casts of fucoids. This rock extends, with only occasional intervals, where granitoid rock crops out, to the mouth of the Wanganui, sometimes assuming the character of a chalk-marl, and sometimes that of a tabular whitish crystalline limestone, full of large oysters, pectens, terebratulas, and pieces of corals, in connection with the same fossils which I observed in the rocks between the Buller and Grey; but here also, as in the latter rocks, I observed no signs of belemnites or ammonites.

Some of these cretaceous cliffs, which are nearly perpendicular, as at the Otahu cliffs, are from 700 to 800 feet high, and consist of bluish chalk marls, from eight to twelve feet thick, with bands from two to three feet thick, of a white crystalline limestone, occasionally assuming a pale yellow colour, giving to the whole a ribbon-like appearance. In those sections where the limestone is found upon the granite, we observe very interesting phenomena, indicating that during the deposition of the limestone, great disturbances had taken place, either by earthquakes or by changes in the direction of great submarine currents. In many places the cretaceous rocks, limestones, chalk marls, or greensands, are seen lying directly upon the surface of the granite, which is sometimes smooth, as if by attrition, and sometimes rugged, as if acted upon by waves or by submarine currents. These sedimentary rocks frequently contain no fragments of hypogene rock, and so continue for twenty or thirty feet, when they assume what at first blush would appear to be quite a granitoid appearance. In a calcareous base are disseminated quartz grains, crystals of feldspar, and scales of mica, in such abundance, that it is necessary to examine it closely in order to convince oneself of its mechanical origin. In other places the granite is overlaid by a breccia consisting of large angular pieces of granite and mica schists, imbedded in a base of a green semi-crystalline limestone, which is besides full of quartz grains and mica. The greater the interval between the sedimentary deposits and the granite the smaller are the angular pieces, the limestone itself becoming more whitish. At a distance of thirty or forty feet from the granite, the angular pieces altogether cease, and mica scales are only occasionally found. The limestone itself begins to assume an earthy texture, and eighty feet from the granite changes into a chalk-marl. In other places, above twenty or thirty feet of quietly deposited matter, fresh revolutions appear to have taken place, and large beds of breccia, similar to those before described, again make their appearance.

As far as I could judge from the boulders brought down by the streamlets, the granite is associated with hornblendic rocks and traps; and the existence of sandstones, like those underlying the Grey and Buller formation, induced me to believe that the same rocks, as well as several metamorphic rocks, existed here, overlying the granite, which had protruded through them. The cretaceous formation leaves the coast at the mouth of the Wanganui, and strikes in a north-easterly direction towards the Tasman mountains, the detritus of which, gneiss granite and metamorphic schists, is again brought to the sea by the larger streams. As described in the foregoing part, between the Tasman mountains and the sea, we again meet with the great drift formation through which all the different rivers have worked their way. At the north-eastern end of the Karamea plains, sandstone ranges are found,

probably of the same age as the Davy mountains. Where the Karamea breaks through the western side of the central chain, the porphyritic granite seems also to exist, but as the state of the weather was such that it necessitated the greatest possible speed, I was unable to ascend any of those streams, which in summer time would have been an easy task.

Four miles north of the Oparara the granite again reaches the coast, and continues, with only little interruption, to the Ihua Tuaroa point. North of the Oparara, and at the mouth of the Rivers Haihai and Whakapoai, we find the remains of what was probably once an extensive secondary formation, which at the mouth of both rivers forms very bold headlands. At the first-named place it consists of a shelly tabular limestone, of a greenish yellow colour, formed principally of fragments of shells of the fragile genera Pecten and Lima, but having imbedded amongst them large oysters, which have better resisted the action of the waves.

These limestone beds are, as far as I could judge, 200 feet thick, and are underlaid by greensands and loose ferruginous sandstones, which rest directly on the granite. At the Haihai these strata are confined to the coast, but in the valley of the Whakapoai they stretch from two to three miles inland. It was here, in climbing round the sea cliffs at the northern side of the Whakapoai river, that Mr. S. Maclay found a seam of coal, which is of the same age as the coal of Pakawau. Enormous masses of boulders, sometimes of great size, are brought down by the torrents, and are carried far into the sea, forming tongue-like beds, jutting beyond the lines of the rocky cliffs.

In the same places we also meet with tertiary deposits, probably of pliocene age, and consisting of loose conglomerates, ferruginous sand, and beds of lignite. The granites here found are of various kinds, sometimes porphyritic passing into felsite porphyry, and sometimes trappean or syenitic, and here and there intersected by straight greenstone dikes. In other places veins of apatite, fluorspar, and pistazite occur. They have sometimes a tabular, and at others a nearly cuboidal parallelopipedoic or polyhedric structure. To some angular pieces of these porphyritic rocks, I found adhering a coat of silicate of copper. In other places grains of oxyde of tin were met with, and had I had time to examine this wild region, I am convinced that the discovery of valuable ores would have rewarded my researches. The rivers traversing this granitic zone bring down, besides granite of all descriptions, great quantities of amphibolites and dioritic porphyries, with pieces of mica schists, quartzites, and other metamorphic rocks of an indistinct character.

The Kaurangi point projects from the last granitic mountain near the coast, which thence strikes inland in a north-easterly direction, towards the Aorere valley, low cretaceous hills then

forming the sea coast to Cape Farewell. The rocks at Ihua Tuaroa, the first promontory north of the Kaurangi point, are greensand, the stratification only discernible by changes in their colour. Whilst the strike and dip of the cretaceous rocks south of Taura-te-Weka, following as they do the undulations of the granite, vary so considerably that it would be impossible to lay down any general rule as to their position in that respect; the general strike of the strata thence to Cape Farewell is from south-west to north-east, with a dip of six to eleven degrees towards the north-west. Behind and between their various masses lie large deposits of drift-sand.

It is evident that the boulders in the rivers along this part of the coast are derived from the northernmost continuation of the gneiss granite zone, which ends where the granite crosses the Aorere river at the Haidinger peak. The cretaceous formation, which above Ihua Tuaroa consists only of hills a few hundred feet high, and changes from greensand into chalk marl and limestone exactly resembling those all along the coast, and with the same fossils, begins to rise at the northern end of the Wanganui inlet, and presents us with high rocky walls, 800 to 1,000 feet high. It was under these hills that I had to seek for the Pakawau coal-field, to the examination of which I devoted several days. Below the greensand, 200 feet thick, I found in descending order the following strata.

	FT.	IN.
Limestone of an earthy texture	150	0
Tabular semi-crystalline limestone	80	0
Chalk marls, with bands of limestone	70	0
Clay marls, changing into greenish clays	18	0
Ferruginous sands	10	0
Conglomerates, alternating with unstratified quartzose sands	40	0
Gritty soft sandstone	10	0
Conglomerate, with pieces of coal, and containing the detritus of the rocks which at present form the boulders of the rivers in the neighbourhood	80	0
Blue marly clays	4	0
Gritty sandstone	12	0
Very ferruginous sand, with concretions of clay ironstone, which also often fill large fissures	30	0
Soft grits	25	0
Coal	0	6
Clay marl, with impressions of plants	3	0
Fine stratified sand	10	0
Coal	0	5

This succession continues downwards for several hundred feet, with small seams of coal, ferruginous sand, grits, and clay marls; and at last we reach the main seam, which, in the Wanganui harbour, is exposed in several places, and is of an average thickness of two feet three inches.

As my friend, Dr. F. Hochstetter, has already treated of the Pakawau coal-field, I think it unnecessary to speak of it; al-

though I feel it my duty to add, that, from observations I made, I am convinced that the seams that are seen in Pakawau are the same as those exposed in the Wanganui inlet, and below which, for several hundred feet, the strata, consisting of sand grits and pebble beds, are visible.

The strata in this extensive zone strike and dip in several directions, forming arcs, of which the upper parts have been denuded. Two of these foldings were examined by me; one at the West Coast, north of the mouth of the Wanganui inlet, following the strata in both directions; and the other south of the hill which forms Cape Farewell; besides which I obtained numerous sections in the Wanganui harbour itself, the results of which are noted in the foregoing table. The greatest dip of these strata does not exceed 16 degrees.

The few impressions of fossil flora which I observed in the Pakawau coal-bearing strata were all specifically, and probably also generically, different from those of the Grey and Buller coal-fields, and no fossil shells rewarded the most minute research. I found near the pah at West Wanganui a piece of silicified wood, derived from a large tree; the annual rings were still distinctly visible, and it was probably the cast of a portion of some coniferous tree.

All these strata exhibit a character which leads to the conclusion that they originally formed either the delta of a large river or an estuary; and it would therefore be interesting to discover fossils, which would at once give us an insight into the true nature of these deposits. The cretaceous limestones and greensands not only lie conformably upon the coal-bearing strata, but their succession in sequence is perfectly visible; so that there can be no doubt that these coal-bearing strata are of the same formation as the overlying rocks.

At Cape Farewell we meet with the same rocks as on the western side of the Wanganui harbour, striking from south-east to north-west, with a dip of 22 degrees towards the north-east. Here, also, at the southern side of the promontory, small seams of coal are visible, under shingle beds derived from the waste of the crystalline chains.

Before arriving at West Wanganui I found in several of the rivers, as far as their mouths, and coming from the Whakamarama range, micaceous shales and grits exactly like those of the Grey and Buller coal-fields, interspersed amongst granitic and metamorphic boulders; and in the Pakawau river itself I was not a little astonished at finding pieces of the same description. As they are in character quite different from those of the West Wanganui coal-field, I was led to believe that the Pakawau river flowed through strata belonging to the same age as the Grey and Buller coal-field.

Looking from the hills south of Collingwood on the right bank

of the Aorere, over the Whakamarama range, a great difference in the character of various parts of the chain was clearly visible. The chain divided by the Kaituna exhibited at its southern extremity quite the same aspect as the granitic mountains observed all over the country; whilst north of that river a stratification, with rugged, precipitous sides of the hills, precisely like that seen in the Papahaua chain, was visible; and it appeared to me that some of those strata consisted of conglomerates.

Knowing that small beds of an earthy graphite had been found in the northern part of the chain, and judging from the boulders which I had an opportunity of examining in different rivers flowing from this chain, I came to the conclusion that a coal-field would be found here; the importance of which, considering its vicinity to Nelson and to the Strait, could not, if it were discovered, be over-rated. Not having time to search the chain in order to satisfy myself of the justness of my deductions, I hoped that I would obtain some information respecting it from persons in Nelson who had visited it; and I was not a little delighted at being shown by Mr. H. Curtis, to whom I mentioned my notions on the subject, a piece of beautiful black coal, which he had himself found near one of the rivulets flowing into the Aorere river; so that the existence of valuable coal in the Whakamarama range is so far proved.

GOLD.

I have omitted in the foregoing geological notes to treat of the gold-bearing deposits, and of the localities in which this precious metal is to be found, preferring to treat the subject separately, and I shall now proceed to offer some remarks on this important matter.

When Sir Roderick Murchison examined, in 1844, the specimens of rocks brought to England by Count Strzelecki from the eastern chain of Australia, he observed a striking resemblance between them and the rocks in the auriferous Ural mountains in Russia, whence he had shortly before returned. Not only was their mineral character the same, namely, silurian rocks, partly metamorphic and associated with younger plutonic rocks, but the chains also corresponded in their meridional strike, and in their altitude. This great geologist came to the conclusion that the Australian mountains, and their detritus accumulated in their depressions and upon their slopes, would, like the Ural chain, contain gold; and he did not hesitate in recommending to the miners in England, of whom many were then without occupation, to emigrate to Australia, and dig for this precious metal.

A few years afterwards gold was found in Australia; but it was

not until 1851 that gold-mining began on a large scale in that colony, the effect of which has been to convert a country then inhabited only by a few farmers, squatters, and convicts, into an emporium of wealth, and to raise it in a few years to a position without precedent in history.

Had Sir Roderick Murchison received the specimens which he examined from the eastern meridional central chain of this Island, instead of from Australia, he would have pronounced the same opinion, based upon his deep knowledge of geology, which, although the newest, is perhaps, in many respects, one of the most important sciences; a knowledge of which is requisite for the sound development of the natural wealth of nations. It is true we have not yet found any fossils in these slaty rocks, but I am convinced that they will be found, and will demonstrate that these strata are of the same geological age as those of the Ural mountains and the Australian Alps. Here, as there, their meridional strike is very little disturbed by eruptive rocks; here, as there, the altitude of the mountains is between 6,000 and 7,000 feet; here, as there, large quartz veins traverse the slaty rocks; and nature has here, perhaps, to a greater extent even than in Australia, done the work of crushing, in the process of denuding the uppermost parts of the lofty ridges where the vein stones were probably most highly charged with gold.

The luxuriant growth of the New Zealand vegetation, together with the absence of roads, has at present confined the work of gold mining to the boundaries of the gold-fields; but it has been proved by a few adventurous men, who have penetrated more deeply into the now inhospitable mountain regions, that the detritus becomes richer in gold, which itself becomes coarser, as we ascend the river courses. We may therefore infer that, were the rich tracts lying in the depressions or on the slopes of the chains, and which cover hundreds of square miles, opened to enterprise, a rich reward would be the result.

As in Australia, the gold is found here in a loose conglomerate or drift, with small seams of lignite (as, for instance, in Golden Gully, Massacre Bay), of two different tertiary ages; and also in the recent alluvial drift, which, however, is generally poorer in metal.

In order to ascertain the existence of gold in the country traversed by me, I first washed in the Rivers Roto-iti and Roto-roa, before they unite; and although we only collected sand from under and between the huge boulders in the river bed, we found nearly in every dish a few specks of very fine scaly gold. This fact was interesting indeed, because, until then, it had been thought that the gold in New Zealand was derived only from metamorphic or silurian slaty rocks; but here we had a proof that it was also diffused in plutonic rocks. It could, in fact, only have been derived from the decomposition of granite, because

both rivers traverse mountains composed solely of that rock, associated with hornblende rocks.

I have since heard that the gold collected in the Batten river, near the Wangapeka, by a small party of diggers there, is found upon the surface of decomposing granite. The gold itself is like gunpowder, and, from the description of the rock given to me by one of the men, I believe it to be hornblendic or syenitic. As the granite between the Roto-iti and Roto-roa rivers is also often hornblendic, may we not infer that the gold in those rivers is also derived from this peculiar rock?

We also tried the river Owen, but were not very successful, one single speck only proving its existence in that river.

Throughout the course of the Buller gold was found in its bed and on its banks; and I collected some handsome specimens of heavy rolled gold in the rents of the tertiary rocks near the junction of the Mangles with the Buller, sometimes taking it out with the knife. I am unable to state whether the gold there is derived from the older tertiary rocks, or whether it has been washed down out of the overlying drifts of probably postpliocene age.

Two of my party went up the Matiri, and tried there, but without any success, although they were experienced hands, and washed through the greater part of the day.

South of the Buller, in the Maruia, as well as in the whole course of the Grey and its tributaries, rarely leaving untried any spot which seemed likely, we searched in vain, unable to detect the least sign of the precious metal.

So that, judging from ascertained facts, I may reasonably conclude that the gold in the Buller is derived from the waste of the chains north of it, and that it is there that we shall find the quartz reefs which contained the gold in their now denuded parts, and the debris of which lie scattered all over the country. Again, in the gorge of the Buller, a few miles from its mouth, small scales of gold were found on washing the detritus.

From what I have seen, I feel confident that the drift accumulated in the Matakitaki plains, as well as near the junction of the Inangahua, where large flats also occur, will one day afford to the digger sufficient reward for his labours; but I would warn him not to venture into that solitary country before roads are made, so that easy communication be maintained with the settlement, in order that he need not lose half of his time in swagging provisions to the scene of his operations.

CONCLUDING REMARKS.

Having given, in the foregoing part, my observations made upon the spot during the course of my journey, I will now finally draw from them some conclusions as to the earlier form of this island,

and as to the periods when the different changes before referred to took place.

The first great change which I was able to trace occurred when the porphyritic granite was protruded, and which, at the western side of the island, appears in such predominant masses. Before this event, which changed the whole form of the country, it appears that large tracts of level land existed, as indicated by extensive coal-fields, and thick deposits of grits and shales, in the formation of which large rivers had a considerable share.

That huge masses of granite had previously existed is evident, seeing that in some places a granitic rock of greater age is traversed in tortuous veins by the porphyritic granite, and seeing also that the grits and shales of the coal formation are principally derived from the decomposition of that older rock. After this period of great disturbance, in the progress of which the mountains of the central chain took nearly their present forms, a long space of time evidently elapsed without any further great disturbance, as proved by the thick cretaceous deposits on the West Coast. These deposits were probably formed in a bay of considerable size, or between extensive islands, as shown by the breccia at Te-ana-o-Matuku and the remains of old sedimentary rocks near Cape Foulwind.

During that time the whole eastern side of the island was probably also in the condition of dry land, no signs of cretaceous rocks having as yet been found there. But the quiet state of the island which immediately succeeded the formation of the porphyritic granites was at length again invaded. Eruptions of plutonic rocks took place, and whilst the western side of the island was raised high above the sea level, its centre became submerged. It was then that in all probability the eruptive masses of the Kaikoras made their appearance.

Another long interval of repose succeeded, during which the large accumulations of the tertiary (miocene?) period, which we find in the longitudinal fissure, and round Blind Bay, took place. These deposits were again upheaved by a fresh protrusion of eruptive rocks, diabases and porphyries, near Nelson and all along the western side of the Spencer mountains. It was then that the island assumed nearly its present physical character.

We also have evidence of another disturbance which took place in the glacial period, during which the country sunk, as in other countries in the same latitudes, and afterwards, rising again, reassumed its present position.

After the last-mentioned eruption of crystalline rocks, volcanic agencies began to work on the eastern side of the island, and thence an important change took place in the level of the country. These agencies are still at work, upheaving young tertiary strata and alluvial deposits, the former of which have already been raised to an altitude of nearly 2,000 feet, and the latter to

the height of 400 feet along the eastern coast, whilst the western side appears to be sinking in an equal ratio.

I have only to express my regret that I have not yet been able to obtain the highly interesting geological data which are to be got by examining the eastern side of this island, and which would no doubt give me a clearer insight into the wonderful operations of nature, and would have enabled me to lay before you a more complete exhibition of facts.

And so the work of the Creator never ceases, and whilst we see before our eyes men, animals, and plants appear, so are new continents and islands continually formed, although to the human eye in an almost imperceptible manner; and as we see things living on our planet, and existing from it, become buried in it, their bodies resolved into the elements from which they were built up and sustained, so the eternal sea forms the great sepulchre for continents and islands, which have served their time, and want repose.

CHAPTER IV.

ROADS, PASSES, AND AVAILABLE LAND.

Having already in the first two parts given a general outline of the country, I shall now proceed to speak of the best means of traversing it, keeping always in view the necessity of opening up for settlement the available parts of its various districts. In my preliminary report I have already stated what I thought of the road selected by Mr. Mackay, namely, that it is a very fair one, not presenting any serious difficulties to prevent its being carried through to the mouth of the Grey; and I presume that it can be improved and shortened, although the pass through the western ranges, from the Maruia plains, necessarily the central point, will always be found the easiest.

One great drawback to the road selected, until we reach the Maruia plains, is the absence of grass land on the banks of the rivers, the few spots here and there found being scarcely worth speaking of. It is therefore of the greatest moment to select such a road as will, when once cut, afford sufficient food for horses and other animals of burden.

Having carefully looked over the country, I think the best and easiest road will be the following. Supposing that, as I believe, the low saddle between the Rivers Wangapeka and Owen can be easily reached from the Nelson side, which must be ascertained from that side (for of the descent on the Owen side I have not the least fear), we could then reach the broad valley of the Owen, which contains grassy patches on the river banks. One mile from its junction with the Buller the road would leave the river, and pass through an alluvial flat on its eastern side, in a south-south-eastern direction towards the Buller. It would then cross it, one mile above the junction of the Owen, where it is divided into three arms, presenting an easy ford. Here also small patches of grass are found on both sides of the stream, now the abode of a herd of wild cattle. By following this road, we should avoid the round-about way by the lake river and the Devil's Grip, where doubtless there are several bad crossings, and where no available land, like that in the Owen valley, exists. I may also state that the road from the Howard over the hills to Lake Roto-roa, and thence

by the Leader creek and the Mangles to the Tiraumea plains, is not so good as that even by the Devil's Grip. The hills are high, and some cuttings would have to be made, which are not necessary on the Owen valley line.

After reaching the Buller and the western foot of Mount Murchison, instead of going down by the river, there are two ways for continuing the road; the first by going south, crossing the River Murchison, towards the northern end of the Tiraumea plains, which may thus be easily reached, as there is low country between the two points. From these plains, instead of going down the Tutaki, I think it much better and shorter to follow that river for twelve to fourteen miles up. As I observed from the top of several mountains, the country there is low and broken, and it would be easy to follow one of the creeks which join the Tutaki from the westward, and thus reach the Matakitaki north of Mount Mantell, where an opening is visible which leads by the Warwick into the Maruia plains, the central station of the road.

The advantage of this line would be very considerable, because we have grass in the Tiraumea plains and up the Tutaki, and in all probability also on the banks of the Matakitaki. It is true that I tried in vain to discover from the summit of the mountains which I ascended whether any grass land existed, but as the country twelve to eighteen miles up the Matakitaki is very low, I should not be surprised if terraces, with grass land similar to those in the Maruia plains, although on a smaller scale, should be found.

Should this road, however (which I do not anticipate), not prove a good one, we still have two other ways to reach the second principal point in my journey, namely, the Matakitaki plains. The first is by the valley of the Murchison, below the confluence of which with the Buller the banks of the latter consist of a terrace 100 to 150 feet in height, along which the road can be carried without difficulty. If considered desirable to cross the Mangles, or Tutaki, by a bridge, there will be found, about 150 yards from its confluence with the Buller, two bold rocks, narrowing its bed to thirty feet, and which offer unusual facilities for its erection, although in fair weather the river can be crossed easily near its junction with the Buller above the falls.

The road would then lead along the terrace, which slopes towards the west, through the Matakitaki plains, to the junction of the river of that name with the Buller; and would thus open out large tracts of fertile land, now covered with forest, scrub, and fern. From the junction we could ascend the Matakitaki, and reach the Maruia plains by the Warwick; or, if the road by the Maruia itself were preferred, I should suggest that, instead of following down the Buller to its junction with the Maruia, it ought to be taken along a valley which joins the Matakitaki half-a-mile above the confluence of that river with the Buller,

whence an opening in the hills leads towards the Maruia in a south-easterly direction.

The Matakitaki has to be crossed half-a-mile from its junction, where an island divides it into two arms. From the Maruia plains the road must follow an opening, running south-south-west. In order to avoid the Bog-saddle, it must be kept on the eastern side of the depression, as far as the junction of the Bog-saddle streamlet with the brown Grey. From here it will be very easy to select a line, so as to profit by the terraces, of course always remaining near the river.

Half-a-mile below the confluence of the Alexander stream the road may leave the Grey, be carried due west, by compass bearing, until, by descending the terraces, it again strikes the river at the lower level of the plains. By this means many ugly gorges and gullies will be avoided. Our own blazed line will be of use for the guidance of the engineer.

As the Grey can be crossed as far down as two miles above the junction of the Ahaura, the road will follow the open country, first on the left bank, and where the Waipuna grass land, or paki, ceases, then on the right bank to the junction of the Mawheraiti. Here, by again crossing, we reach the open country, at the foot of the Ohinetaki-taki terrace; and having arrived at its southern extremity, it would perhaps be better to continue on the left bank, by bridging the Ahaura, to the junction of the Kotukuwakao with the Grey. By this means all the fertile land on that side of the river would be easily reached.

Above the junction of the Kotukuwakao a ferry would have to be established across the Grey, and the road, after continuing for a few miles along the hills, would emerge upon the level triangular flat near its mouth. To reach the level country near the Karamea, I think it best to search for a road by the Wangapeka. As the chains south of the Buller are intersected by many transverse valleys, so the chains on its northern side, which have never been explored, will no doubt offer similar facilities for reaching the Karamea, should the quantity of available land there be considered worth the expense of a road. Even should this not be the case, however, I have not the least doubt that in the depression between the chains which the road would traverse, a most valuable gold-field would be discovered. I am unable to say whether vessels of any large tonnage can enter the Karamea; should such be the case, the country near it would be of course more valuable.

Another road might be taken to the Karamea up the western branch of the Matiri, because, I as have already stated, an opening is visible quite through, and there would therefore be no serious difficulties to overcome in order to reach the West Coast, near the mouth of the Wanganui, from the Matakitaki plains. Even, therefore, if a fair road cannot be found by the Wangapeka

through the central chain, it will always be easy, at a small outlay, to reach the Karamea plains by the Matiri, there being available lands on the banks of that river which would compensate for the additional expense of constructing that line.

I have not seen the country through which the road from Collingwood to the mouth of the Whakapoai would lead, but I think it is not worth while to incur the expense of opening that district, where only a very limited amount of land could be available, which, too, can be reached by pedestrians from the Karamea. A road for animals of burden, between the Haihai and Whakapoai river, by which alone the Aorere could be connected with the Karamea district, would cost a great deal of money, and therefore the road by the Wangapeka would still be preferable. It may also perhaps be possible to construct a road from Little Wanganui, between the coast hills and the Lyell range, where open tracts of country lie, which would bring us to the Mokihinui river; but this, owing to the very broken nature of the country, could not be done without great outlay.

Having treated so far of the principal lines of road, I will now proceed to speak of such branch roads, necessary to unite the different parts of the country, as could be constructed without great expenditure.

Between the Grey and Buller, the best and easiest road will be by the Mawhera-iti, over the low saddle into the Inangahua, and down this river into the Oweka plains; so that this extensive flat may not only be opened for settlement, but also for gold-mining operations, which I think would pay well if the diggers could remain at their work, and get their provisions partly by means of an easy road and partly by cultivation on the spot.

From the Oweka plains a road might, if necessary, be constructed by the Orikaka to the low saddle, north of Mount Frederick, which leads to the mountain plateau in the Papahaua chain. Thence, following the Waimangaroha to the seashore, the mouth of the Buller is easily reached. This road will also afford an easy, though circuitous, road from the mouth of the Buller to that of the Grey, which, by the coast line, either on horseback, or even for a pedestrian not accustomed to such a task, would be impossible.

Another road to connect the two harbours would be found through an easy pass, as the natives assured me, from the Waitakere, through a depression in the Paparoha chain, to the headwaters of the Otututu river. By that line, if adopted, the level land between the Rivers Buller and Waitakere, of which a good deal is available for agricultural purposes, would be opened out, and moreover the road would be shorter than that by the Orikaka, Inangahua, and Mawhera-iti, &c. Another easy pass leads from the sea coast by the Kokiwi, north of the Davy mountains, into the last tributary of the Grey on its northern banks.

Having cited my authorities concerning the two last-mentioned passes, I may add here that the sources of the Grey and Maruia were perfectly well known to the Maories. Tarapuhi, the chief at the Mawhera pah, and his brother, Tainui (Veritas), from Kaipoi, made me a sketch on the sand; showing the rivers by deep furrows, and the mountains by little hillocks, which I have since found to have been perfectly correct. They made it in order to show me the best way to the east coast, and it will not be uninteresting to hear what they told me in relation to it. Beginning from the north, they described the first pass to be by the head of the Maruia, through the Kopi-o-Kaitangata (the thermal springs in which were perfectly well known to them), over a low saddle, into the Otaku, the Henry of Mr. Travers; the second, from the Pohaturoha or Grey, or Boyle of Mr. Travers, into the Otuteawa, or Ann of the same explorer; and the third, from the Ahaura into the Whakarewa; the three eastern streams all falling into the Waiau-ua. They described these three passes as very easy, and they assured me that they can be travelled in the middle of winter, as they themselves have done, without any fear of being stopped by snow; assuring me that there never was snow, probably meaning that it did not remain on the ground.

The fourth pass is by the Taramakau and the Hurunui, which, however, the natives consider as not so good as any of the three before mentioned, because in winter time there is a good deal of snow lying on the saddle between the rivers, and of which, a few years ago, Messrs. Mackay and Rochfort had a rather disagreeable specimen. The height of the saddle is due to the fact that the chain itself has not been broken through by the rivers; so that the traveller has to cross the main range at a considerable altitude, in order to pass from one river to the other. If it can be satisfactorily ascertained that there would be no serious difficulties in descending from the Boyle towards the depression where I first struck the Grey, I think that the West Coast could be easily reached by the Waiau-ua, and perhaps at less cost, that road having at the same time the advantage of pasture all the way. The natives assured me that there were no difficulties in this line, but as they generally travel along and in river beds, we cannot fully rely upon their judgment in the matter.

There is another pass also from Lake Roto-roa into the Clarence country, often used by the Maories in former years.

That it is also possible to reach the Karamea from the Matiri, and probably by what may turn out to be an available road, has been also proved by a large Maori party which travelled many years ago from Port Cooper to West Wanganui by that line. By following up the Brown Grey, I think an easy road will be found into the Inangahua; so that, without going by way of the Grey itself, that available country could be reached by a more direct line.

In the two first parts I have already touched upon the position of the available land in the districts traversed by me, and I will now enumerate more fully what I conceive may be fit for purposes of settlement.

The Tiraumea plains consist of about 3,000 acres of open land, the greater part of which is covered with grass, and the rest with scrub and fern. I estimate that one-half of it, say 1,500 acres, are fit for the plough. At the southern side of the Buller, where the Roto-iti and Roto-roa rivers join, we find also some hundred acres of fern land, the major part of which, however, is too stony for cultivation. For the first two miles up the Roto-roa river there are some wooded flats, the alluvial soil of which seems to be of a rich nature. West of Mount Murchison a large flat occurs, which, near the river, is stony and scrubby, but towards the south is covered with forest on a soil of better quality. The valley of the Owen, in some places a mile and a-half broad, contains a considerable quantity of good forest land, with patches of grass land between. The Buller on its left bank below the Murchison, and its tributaries the Murchison and Mangles, have large quantities of level forest land, lying principally on a terrace forty to sixty feet above the level of the water. The vegetation here consists of kahikatea, rimu, totara, tawai, &c., mixed with black birch, which latter, in the higher ground, forms the whole forest.

The Matakitaki plains contain, as far as I could judge, about 20,000 acres of level land, with a very good soil. They lie on both banks of the Buller, and are in great part covered with totara forest. In some places, however, there are considerable tracts, clothed with high fern and scrub growing in a strong and fertile soil. Whichever main line of road may be ultimately adopted, a branch road into these plains may be necessary, inasmuch as not only will the available land there be useful for cultivation, but gold-mining pursuits will in future years make it the abode of a large mining population. There is also some very fine forest land covered with mixed wood, of which the totara is the most abundant, on the banks of the lower Maruia.

In the Maruia plains there is a considerable quantity of land, the extent of which, including the terraces to the foot of the mountains, I calculated to be 23,500 acres, one-third of which is good agricultural land. The Grey country, as I have before stated, consists principally of well-timbered land, in which we find a mixture of all the various trees generally found in level forest, namely, totara, kahikatea, rimu, tawai, &c. Where the soil is poor, black birch predominates, whilst in other places totara and kahikatea form the principal part of the forest. Generally speaking, the alluvial soil is very rich, and fit for every kind of cultivation. The grassy spots are mostly confined to the banks of the rivers and streams, and consist either of one single high terrace, or of several smaller ones rising above each other.

I shall now enumerate the different pakis, or open tracts of land, and give a short description of them.

The Ohinetaki-taki, between the Grey and the Ahaura, is a terrace of about 150 feet in height, generally covered with a luxuriant growth of grass, but in some places scrubby, and in others stony. In front of it, along the left bank of the Grey, runs a belt of land, containing very fertile soil, covered with manuka, flax, fern, and grass, which will be valuable for agricultural purposes. The low land near the river comprises about eight square miles, and the terrace above it about ten square miles.

The next paki, called by the natives Te Ikamatua, lies on the right bank of the Grey, above the junction of the Mawhera-iti. It is also covered with a mixed vegetation, similar to that in the low land of the Ohinetaki-taki. There is here but a very small grassy terrace on its northern side, the forest beginning immediately behind it. The greatest part of this paki consists of very rich alluvial soil, which will make the whole valuable for agricultural purposes. Extent, about seven square miles.

The Waipuna is a paki on the left bank of the Grey, where it enters the plains. It consists of four successive terraces, of different relative altitudes, of which the uppermost is highest, the whole covered with the same character of vegetation as the two pakis before described. There is also some very fine land near the river, and the whole will contain about six square miles.

The paki on the banks of the Otututu consists of four terraces of no great height, the three lowest being each from eight to fifteen feet, and the uppermost sixty to seventy feet high. Contents, about four square miles; and, for the greater part, stony and unfit for cultivation.

The paki at the Mawhera-iti, in addition to a belt of grass and scrub on the banks of the river, comprises several fine grassy spots, of which the first, on the eastern side, three and a-half miles above the junction of the river with the Grey, is a flat about two square miles in extent, consisting of very fine agricultural land. The two next, towards the north, lie on the western side of the river, and are also covered with grass, but are partly stony. Eight miles up the river the terraces become higher, and interposed between them and the river a belt of grass land, from one quarter to half a-mile broad, partly composed of very rich soil. The terraces themselves are covered with stunted manuka, fern, mosses, and toi-toi grass: they are generally swampy, and unfit for agriculture. The extent of good open land at the Mawhera-iti may be estimated at eight square miles.

I have not visited the grass lands on the banks of the Inangahua and its tributary, the Wharau, having only seen it from the mountains which I ascended. They are of large extent, and contain, as far as I could judge, in each valley, from 10,000 to 12,000

acres, having also terraces on both sides of the river, mostly covered with grass.

At the junction of the Inangahua with the Buller, we find a large amount of fern land in the Oweka plains, which Mr. Rochfort, who visited them, estimated at 60,000 acres, which estimate tallies with observations made by me from the summit of Mount William above them.

I think that, after making a fair deduction for hills, river-beds, swampy grounds, &c., we may safely estimate that the Grey plains, south of the saddle between the Inangahua and Mawhera-iti, contain 250,000 acres of level land, fit for agricultural and pastoral purposes. If the Government contemplate reserving proper spots for townships in the Grey plains, I would suggest that they should reserve a tract near the junction of the Mawhera-iti with the Grey, on the eastern bank of the former. A mile from the mouth of the Grey we also find, between the low hills near the coast and the Davy mountains, some level bush land, about 5,000 acres, in which the best site for a township in connection with the Grey will be found, as vessels visiting the harbour can ascend to this point and find shelter, during heavy freshets, in a small indent of the river.

Along the coast, until we reach the Waitakere, there is not a spot which (unless gold or some other valuable metals can be found) offers the least inducement for a settlement.

The delta of the Buller has a triangular shape, of which the mouth of the Waitakere on the south, and the mouth of the Waimangaroha on the north, form the boundaries. Between these two points it extends twenty-two miles, and its broadest part, near Cape Foulwind, is seven miles, running inland. It contains some 50,000 acres of level country, of which nearly two-thirds consist of open terrace land, partly very stony and mossy, and partly swampy; so that only a small portion of it, in its present condition, is fit for cultivation, although a good deal of it could be improved by drainage. The best land is here also found on the banks of the different rivers which traverse it, and is there covered with dense vegetation; similar land being likewise found on its sea banks.

A township could be laid out on the southern bank of the Buller, where a deep water lagoon offers considerable advantages for a harbour. But, as there is not much back country, I think that the mouth of the Grey will always be preferable.

The Karamea country contains some 25,000 acres of fine level forest land; and here also, on the southern bank of that river, a township could be established, the more useful if it can be ascertained that the river can be entered by coasting vessels.

It would lead me too far were I to enter into details concerning the forest land lying between the Ihua Tuaroa point and the West Wanganui inlet, more especially as it is improbable that the mere

existence of a few thousand scattered acres would induce the Government to incur the expense of opening up that district.

In my estimates of the extent of available land in the various districts, I have endeavoured to keep as closely as possible to a fair average, rather preferring to understate, according to my own judgment, than to make any overstatement; so that it is possible that, on further investigation, it may turn out that the real extent of available country is in excess of the quantities given by me.

CHAPTER V.

ZOOLOGY.

Although an account of the fauna of New Zealand is not likely to excite in the reader the same emotions which are created by the perusal of adventures in other wild regions of the world, the observations on zoology which I was able to collect during my journey may nevertheless be found not altogether devoid of interest.

The fact that no poisonous or ferocious animals exist, so that the traveller can lie down both during the day and night without the slightest fear in this respect, added to its fine climate, justifies me in stating that this country is eminently suited to the European settler. Often during the long winter nights, whilst sitting round our camp fire, and during the day, whilst wading through swamps and rivers, and scrambling through forest and jungle, we felt great comfort in the knowledge that we had nothing to fear either from insidious snakes coiled beneath our feet, or from ferocious animals in ambush, ready to make their deadly spring. My observations will therefore be of a very peaceful nature; and I must hope that in depicting the quiet life of the harmless inhabitants of the wild regions through which I passed, I shall be able to invest with some degree of interest the solitude of its primeval plains and forests.

Of the Mammalia I have very little to say, because, with the exception of those belonging to the family Phocidæ, there is scarcely anything to observe. I had, in fact, no opportunity, whilst travelling round the coast, of seeing any of these animals; but Mr. John Rochfort, who preceded me by a few weeks, killed a sea bear (Ursina marina), seven feet long, which, with its female, was found near Te-ana-o-Matuku, lying amongst huge masses of rock, which can only be reached from the shore at low water spring tides. Seals, as the natives assured me, have almost deserted the coast, and it is but rarely that they are met with, although at one time they were very numerous in its more rocky parts.

In several works I have seen allusion made to a quadruped supposed to exist in the lakes of this island, and which, from descrip-

tion, must have been closely allied to the beaver (castor). Indeed one person, who had often been at the Roto-iti, assured me that the existence of such an animal there was certain; but, although I searched very closely, I was unable to detect any indications either of its tracks or dams, or indeed any other signs of its existence. One circumstance, however, leads me to believe that the lake is inhabited by an animal not yet known. One night we had fastened the results of our fishing, consisting, perhaps, of twenty pounds of eels, to a fishing line, and laid them in the water near the margin of the lake, in order to keep them fresh. One of my men suddenly heard a great splash, and, running down to the water, found that the eels had been dragged out, and that but for the fact that the line was fastened round a large stone, they would have been carried off altogether. I am unable to say whether a very large eel might not be strong enough to have done this; but, if not, we must suppose that there exists in the lake another fish or animal of which we as yet know nothing. It cannot, however, belong to the family castor, which feed only on bark; but it may probably be another member of the order Rodentia. I relate this circumstance in order to draw attention to the subject.

The native rat (Mus rattus) is the only known indigenous land quadruped; but although it is said that in some places it still exists in large numbers, I was unable to find any. Its place has been taken by the English rat, by which it has been nearly extirpated. Living principally on berries, it was formerly highly prized by the natives as food. It has become a common saying among the Maories, that as the English rat (kiore Pakeha) has destroyed the native rat, so in time will the Maori vanish before the white man. These English rats are to be met with everywhere. They seldom find the traveller during the first night, but if he remain any longer in the same place, these unwelcome guests at once make their appearance, and disturb his rest. Generally speaking, nothing is safe from them. They are remarkably fond of bacon: it is singular enough that they do not touch flour, contenting themselves merely with destroying the bags in which it is contained. They tried shot, in which the marks of their teeth were found. Some of them grow to a size far beyond anything I ever saw in Europe.

In the open plains dogs are found, but they are not numerous; the tracks we saw indicated that they belonged to a large breed. One which I saw at the Mawhera-iti was nothing but a mongrel, such as are generally found in the native pahs. The old native dog (kuri) seems to be extinct.

As far as I could observe, no flying animals, except the Scotophilus tuberculatus and Mystacina tuberculata, exist in the country traversed by me.

It is well known to the settlers of the province how abundant

wild pigs are on the eastern side of the central chain, so that in some places, as in the Wangapeka valley, for instance, they have uprooted large tracts of country. It is therefore surprising that, although they would find no difficulty in passing through the Devil's Grip, not a single pig is to be found in the Buller, or in the meridional fissure, or indeed in any part of the Grey district. In former years the natives on the West Coast had some pigs, which they allowed to feed round their habitations; but, fearing that they would destroy the fern root, upon which they depended principally for food, they killed them all. In order to show how abundant these wild pigs are in some parts of the country, I may mention the fact, that a party of three men killed, in twenty months, and within an area of 250,000 acres, no less than 25,000, under a contract, and that they offered to take another contract to kill 15,000 more upon the same ground. In the open country near Mount Murchison, on the Buller, we met with numerous tracks of wild cattle, which probably came down in former years from the Roto-iti valley, through the Devil's Grip.

The only living objects, therefore, which give animation to these solitudes are birds. Amongst them we may assign the first place to the white crane (Herodias flavirostris). This magnificent bird lives principally in the plains, where the rivers, flowing over shallow shingly beds, afford it sufficient opportunities of fishing. Sometimes it is observed sitting motionless on the top of a high tree, near the water's edge, and it is really beautiful to see its graceful form and snow white plumage sharply defined against the deep blue sky. It is very difficult to approach it, as it is very shy, and takes to the wing at the least noise. The Botaurus melanotus, the bittern, and the grey crane (Herodias matuku), are also occasionally met with.

In the plains, too, we find large numbers of Paradise duck (Casarca variegata), generally in pairs together, but sometimes in large flocks, breaking the stillness of the scene by their shrill cries. The most abundant member of the family Anatidæ, however, is the whio, the blue duck of the settlers (Anas malacorynchus). It is found in all the rivers, and is easily killed. It appears to prefer shady places and the deep pools formed in the gorges of the streams and rivers, but is also found in the plains.

In the open districts, and on the outskirts of the forests, we also find two members of the Falconidæ family. The largest of them, the Falco harpe, is a stupid bird, remaining quietly perched on a branch whilst the traveller approaches. It is not so bold and pugnacious as the smaller, Falco brunnea, which is frequently met with, and which, whilst rearing its young ones, fearlessly attacks any intruder who may happen to come near its nest. One day, walking along near the margin of the forest in Camp valley, my hat was suddenly knocked off my head, and at the

same time I heard a shrill cry. On looking up, I found it was one of these courageous little sparrow-hawks which had attacked me, and which, after sitting for a moment or two on a branch, again pounced on me, and although I had a long compass stick in my hand, with which I tried to knock it down, it repeated its attack several times. The presence of my whole party even did not intimidate them, and they frequently exhibited their courage by attacking us.

We met with another instance of the courage of these birds in the Matakitaki plains. A white crane of large size standing in the water was attacked by three of them at once, and they made frequent and well concerted charges upon him from different quarters. It was admirable to behold the kotuku (white crane), with his head laid back, darting his pointed beak at his foes with the swiftness of an arrow, whilst they, with the utmost agility, avoided the spear of their strong adversary, whom at last they were fain to leave to fish unmolested. Another day a cormorant (Graucalus varius) passing in the same neighbourhood near a tree, on which two of these sparrow-hawks were sitting, they instantly pounced upon him, putting him to hasty flight with a shrill cry of terror, followed closely by his smaller but fierce foes, and all three were soon out of sight.

In speaking of the cormorants, I may add that there are several species which exist all along the rivers and sea coast. They are capital fishers, and one day I was witness how well they understood how to procure their food. It was near the spot where one of the northern spurs of Mount Murchison slopes down to the Buller, which here forms small falls and rapids. A cormorant was standing on an isolated rock, round which the foaming water dashed down, and I was not a little surprised to see him jump down into the white foam. In the first instance I thought he would not get out again, but would be dashed to death by the whirling waters; but soon he reappeared, swimming rapidly towards the edge, and then flying on to his old observatory to continue his sport. It is probable that small fishes are taken down by the falls, and, being stunned by the force of the water, are easily caught by the courageous bird. A new proof that nature has given to every animal the necessary physical strength to contend with the elements in which it has to look for its subsistence.

The quail (Cotornix, N. S.) is still very abundant upon the grassy plains of the interior; at every moment it is met with rising close to the foot of the traveller, and it is perhaps the best sign that not many dogs exist there, as they would otherwise have been already destroyed. But amongst all the birds which I met with none is in so great numbers as the weka (Ocydromus Australis), belonging to the family Rallidae, and commonly called the woodhen. It is found everywhere on the grassy plains and

in the forest, as well as near the summits of the mountains amongst the sub-Alpine vegetation. It is omnivorous, and seems to me to be the true scavenger of the country. It despises nothing. Bread, flour, bacon, yellow soap, and even the remains of its own kindred, are greedily devoured. They quickly find out a camp, where their instinct leads them in search of food.

The woods resound with their call, which consists of two notes in the octave, of which the lowest is the first given. We caught a great many, as a valuable addition to our stock of provisions. The capture is generally made by the means of a flax snare at the end of a stick, keeping behind it a smaller bird, at which they run pugnaciously, and even when there is no time to take them in this way, no small bird being at hand, they come to the snare, attracted by a branch rustled on the ground behind it, accompanied by an imitation of the notes of one of the smaller birds. We have even caught them with the hand, by simply exhibiting a dead robin. The weka lays four to five eggs, yellowish white, with chocolate-coloured spots, of the size of a fowl's egg, in a nest prepared rudely with a few dead leaves and dry grass in a flax bush. It breeds in the months of November and December, like all the other birds of New Zealand, with the exception of the kaka (Nestor meridionalis), which breeds only at the end of summer, say at the end of February and beginning of March. The weka has great affection for its young ones, and it was often with the aid of one of them, which were easily caught, that we secured the parents, a note of distress from the young bird invariably bringing the old ones to its assistance, when they were easily caught in the snare held in readiness.

On the summit of the mountains I met with a very shy bird, resembling closely the plover (Charadrius), which till then I had never seen. On the lakes, besides the several inhabitants before enumerated, we found the crested grebe (Podiceps cristatus?), of which only very little is known.

Another inhabitant of the plains in former years was the kakapo (Strigops habroptilus), the night parrot; but it seems that it is now nearly extinct there, and that it has found a refuge in the wild mountain regions, unmolested by man and dog. In former years the Maruia plains were a celebrated hunting ground of the Maories for these birds, but we did not even observe their tracks in the sand or hear their call, and only in the upper Mawhera-iti have a few of late been observed.

The kakapo lives in holes burrowed in the ground, where it remains during the day, coming out in the night; it feeds on berries and roots. Although able to fly, it rarely or never takes to the wing, as the natives assured me, who in former years often hunted it. For this purpose they generally went to the plains, when the berries of the tutu (Coriaria sarmentosa) were ripe, which are a favourite food of that bird, selecting fine moonlight

nights. They ran them down partly with dogs, or even killed them with long sticks upon the tutu bushes: another mode was, when they had found out their holes, to introduce a long stick into them, to which they had fastened several strong flax snares; feeling the bird with the end of it, they began to twist the stick so as to bring some part of the bird into the snares, and thus drag it out. The call of the kakapo, heard during the night, very much resembles the gobble of the turkey.

In the forest a great variety of birds is to be observed, but it would lead me too far were I to enumerate them all. Some of them are seldom seen, but are everywhere to be found, as for instance the ruru (Athene Novæ Seelandiæ), the "more pork" of the settlers, the two melancholy notes of which are invariably heard one hour after sunset and one hour before sunrise.

Another inhabitant of the forest and rocky mountain sides is the kiwi (Apteryx Australis), which is still abundant in many spots, and, judging from their different calls, of various species. As unfortunately I had no dog with me, I was not able to procure any specimens of them, but, after what I could observe on the summits of Papahaua, the tracks in the snow showed me that the native description of a large kiwi, like a turkey, could not be well exaggerated.

The noisy kaka (Nestor meridionalis), plays a conspicuous role in the forest. It is a gregarious bird, perching generally on the highest trees, but as soon as the assembled flock hear a noise unknown to them they approach, amusing the traveller by their various quarrelsome notes and shrieks. If in shooting after them one only is wounded so that it may be secured, it is an easy matter to shoot one after the other, as they always come back when they hear the cry of their wounded companion.

It is true that the New Zealand songsters cannot be compared with the European singing birds, but their music has also its charms, and it is a moment of delight for the traveller to listen to the concert of all the different birds when the morning dawns. Amongst them the kakorimaka (Anthornis melanuris) is the most conspicuous. I can only compare their united tune, as Captain Cook has already done with great justness, although each Anthornis has only a few notes, to well tuned chimes, and I never was tired of listening to their morning concert, which generally ceases when the jealous kaka begins with its discordant screams. The tui (Prosthemadera Novæ Seelandiæ) is another songster which assists in the performance of the concerts.

Two other birds are very numerous. The first is the kakako (Callaeas cinerea), the New Zealand crow; generally a pair is together; they remain in the lower grounds, and are not frightened at men, so that they can be easily secured. Their musical although melancholy notes, which harmonize with their sable hue, resounding through the tranquil woods, give a certain charm

to their appearance. Another and more gay fellow, belonging to the family Turdidæ, is the piopio (Turnagra crassirostris), the thrush of the settlers. It is a very inquisitive and social bird, generally making its appearance as soon as the traveller halts.

The beautiful pigeon (Carpophaga Novæ Seelandiæ) is also abundant in the lower countries, where the vegetation does not principally consist of fagus (black birch). Where this tree is predominant the birds are not so numerous. This bird is so stupid as often to remain sitting upon a branch until the traveller has cut a long stick and passed the flax snare at the end of it round its neck. Amongst the small inhabitants is one which by its tameness always gives animation to the camp: it is the Totoara, the New Zealand robin, which is the first to welcome the explorer in the wilderness, and which remains steadily near the camp. Gravely does it look to the doings of men. I observed how strictly these robins maintained the right of priority. The second comer was always fought till he went away, and the first remained on the spot till he was killed for fishing or snaring purposes, when the second one very soon took his dangerous place. At first it is perfectly fearless, and I have seen one of them sit on my hand with which I held my paper when sketching, and pecking quietly at it.

There are still two others, which are always near the tents: the fan-tailed flycatcher, belonging to the family Muscicapidæ, very fond of the neighbourhood of man, and the New Zealand wren (Certhiparus maculicandus), both never tired of flying and hopping round the tents. Of the latter I observed several species in the interior, which will prove to be undescribed.

On the sea shore, near the mouths of rivers, we again meet with the paradise duck, but the most numerous bird all along the coast is the torea (Hematopus picatus). It is pleasant to see this red-legged and billed fellow run along the shore under the crest of the waves, picking up the mollusks and small fishes which are brought by them or remain behind when they recede. At high water they generally assemble together, as there is not such good opportunity for fishing. Although rather of a fishy taste, they offer to the traveller who is in the possession of a gun sufficient material for a meal when he is in want of it.

Another interesting sea bird belonging to the gulls is the karoro, which skims rapidly over the surf, seizing the shell-fish, principally Venus intermedia, on which it lives; and, being unable to open the shells with its beak, nature has taught it another way. I observed them very often how they rose over the rocky shore, and, arriving at an altitude of 60 to 100 feet, let the shell fall so that it would break upon the rocks below.

Another bird, belonging to the gannets, is also very abundant; it has a very graceful flight, sailing high above the water on

expanded and almost motionless wings. Perceiving its prey, it goes down like an arrow.

Of moa bones (Dinornis, &c.) I did not observe any, although the natives at the mouth of the Grey assured me that in the swamps near Lake Hochstetter a good many occur.

Of lizards I found nothing new, the specimens seen and examined having already been collected by me before at other places.

The principal, and, as I may say, the only, fish of importance in the rivers, lakes, and swamps, is the eel. We caught some nearly six feet long, and as thick as a man's thigh, weighing between twenty and twenty-five pounds. It is easily caught after dusk. Of their capacity of swallowing we had a striking instance, finding in the belly of one of them, not weighing more than twelve pounds, an entire blue duck. There are many varieties amongst them, of which I observed two principal ones. The first has a very large head and a small body, and the second a small head and a thick body. The first one is, as I have been told, confined principally to the swamps, lakes, and upper parts of rivers; and, in fact, nearly all the eels which we caught in the two lakes and in the Upper Buller were of that kind; whilst in the Middle Buller and Lower Grey the greater part belonged to the second species. At several places both kinds occurred together; so that it will be impossible to lay down a general rule as to the localities which they inhabit.

They are a very rapacious set. To relate only one case: one of my party had cleaned some kakas in a stream, and laid them down on a large boulder near its margin. He turned away for a moment, heard a splash, and, looking round, saw a good-sized eel, which had taken one of them, and was quickly out of sight.

Amongst the Mollusca, I think that everything which came within my reach round the coast has been collected and described already, unless it be a very large Chiton, which is nearly five inches long, adhering to the rocks of the Tauperi-kaka cliffs. In the pools on the rocky shores, the Haliotis Iris (mutton fish) is the principal inhabitant, growing often to a large size. In the same localities we also find sea-stars (Asterias) and sea-urchins (Echinidæ).

I may add here that many of these rocky pools offered me a beautiful insight into the life of the sea anemones (Actiniæ). Like magnificent flowers, they seem to blossom in the water, moving their delicate tentacles to attract prey. Who would think that these elegant forms belong to such voracious animals? Around them we meet with little groves of graceful Algæ, in different colours, the whole enlivened by innumerable mollusks and annelides; an entire world in a little space; and it was often with great regret that I continued my journey, leaving these spots, which would be, for the naturalist who could devote his time to their examination, a source of delight and instruction.

The kuku (mytilus canaliculatus), the mussel, is also very

abundant on the rocky coast, and affords to the traveller ample means of subsistence. I did not meet with the rock oyster.

In both lakes the Unio is abundant, and is very much coveted by the native for food. Beside it, adhering to the rock and to the water plants, I found species of the genera Physa, Anateira, Corniforma, and Amnicola ciliata, all well known species, besides a new one, in Roto-roa, belonging to the genus Lymnea.

Of land shells no large Helicidæ came within my observation, but I collected some very fine though small specimens on mosses in the Grey plains, and another and large one on the leaves of the kiekie, near the sea, which I think are also undescribed.

Amongst the Crustacea nothing was observed by me which I had reason to think had not already been described, but the class Arachnida is one which ought some time to be carefully studied by a naturalist, because I am certain that it would be difficult to find any country in which such a variety of spiders occur as are to be observed in New Zealand. There scarcely passed a single day when I did not see new forms—red, green, brown, yellow, and black spiders; in fact, hardly a shade was unrepresented, black with red spots, red with black spots, &c., striped and mottled, belonging to many genera, and of all possible forms and sizes; some of them which I observed of so remarkable a shape, that I think it not improper to speak more fully of them.

On the huge rocks lying on the margin of Roto-iti and Roto-roa I observed a spider, belonging probably to the saltigrades, four lines long from the end of the abdomen to the beginning of the mandibles, greyish brown, the cephalo-thorax darker and mottled, running or leaping over the rocks with great rapidity in search of insects. The mandibles, instead of having the usual length, are nearly seven lines long, of a horny substance, folded inside, returning thus towards the mascillæ, probably destined to catch their prey and bring it to the mouth. These mandibles stand nearly upright. After leaving the lakes I never saw this species again.

I found another very interesting spider amongst the boulders in the Tutaki, shortly after sunset. In the first instance, I thought it was a river crayfish, from its size, the animal being nearly two inches long, but on closer examination I found that I had been mistaken. I had no idea that such an enormous spider existed in New Zealand, and I called Mr. J. Mackay, then with me, and who had gone over the river to collect firewood, to hasten back. He also was quite astonished, and he told me that not only had he never seen it during his manifold explorations through the country, but even that he had never heard of it from the natives. Not one of my insect glasses was wide enough to contain it, and I was therefore obliged to let it crawl lazily away. The antennæ were large, slightly curved at the end; the cephalothorax small, and attached to the abdomen by a thin peduncle.

The abdomen itself was oval, and one inch and a-half long and nearly an inch broad, of a yellowish grey colour, with three brown longitudinal stripes.

Since my arrival in Nelson, Messrs. J. Rochfort and Smith having returned from an ascent of Mount Arthur, the former gentleman related to me that near the summit, under a rock partially covered with snow, they had seen a spider of enormous size; he made me a sketch of it, which coincides singularly with my own observations; a fact worth noticing, if we consider that there is a difference in altitude of at least 5,000 feet between the places where this spider has been met with.

In the forest near the Maruia plains I was once stung by a small animal, which, on examination of it in a partly crushed state, I was convinced must be a true scorpion, but of a diminutive size, two lines long. The sting, however, proved to be no worse than the bite of a mosquito, although the swelling lasted a little longer. I am not prepared to say if the animal had been in the branches collected for bedding and put in the tent, or if it issued from some rotten wood lying near it.

Amongst the Coleoptera (beetles) I found not one worth noticing particularly. I met with but few of them, and those have been already described.

A great scarcity of Lepidoptera (butterflies, &c.) was remarkable even on the grassy plains; for, with the exception of a few specimens of Vanessa Gonerilla, Cynthia Cardii, and the common Nyctemera Doubledayi, I think that there was nothing which attracted my attention. But I met with a variety of moths, for the greatest part small, but often in such immense numbers that they became troublesome.

One evening, in the middle of January, at Roto-iti, a small moth, belonging to Tineites, came into our tent, in such quantities, as night came on, that it was impossible to continue to write. They actually filled the inkstand with their bodies, put the candles out, and covered everything. The next evening we shut the tent as closely as possible, and then we were not so much molested, but they pattered against the canvas in such numbers as to give the idea of a shower of rain, and the next morning the roof was literally covered with their bodies. They became fewer when it rained the third evening, so that we could again leave the tent open to enjoy the fresh evening breeze.

Amongst the Diptera, the animal the most diffused over the whole country is the sandfly (Simulium). Although everywhere present, their principal abode is near rivers and the sea shore, where they form really a plague for the traveller. From Captain Cook to our own days, every explorer has endeavoured to describe, with strong expressions, the intensity of his sufferings from this insect torment.

Notwithstanding their minute size, their bite is painful, and

swellings with itching are the consequence; but I found that after some time we became less sensitive to them, and the swellings were not so large. There were places where they were really dreadful; innumerable quantities of them attack the explorer, and there is no way to protect himself. I made the observation that in the tents, during rain and shortly after rainfall, they were the most savage. Often then we were enveloped with clouds of them, and no part of the body was safe. Those of my poor companions whose clothes were torn, suffered of course much more than the others. Although their abdomen is narrow and elongated, I could not but admire how they expanded and became quite round during the process of sucking, and instead of a blackish blue colour they became transparent and red, often gorging themselves till they were unable to fly.

It seems that they are destined in the economy of nature to destroy putrid vegetable matter. Often I saw large quantities of kelp lying on the sea-shore, and arrived at a certain state of putrefaction, totally covered with them. As soon as it becomes dark they disappear, and the explorer can enjoy some rest. Their greatest foes are clearings and cultivations, and it is wonderful to observe how soon they disappear before the work of men. The Maori pah at the Grey, for instance, was in former years so infested by them, that the natives, in order to save themselves, had to build low huts with fires at the two only openings, sitting thus in the smoke; but since they began to cultivate a good portion of the land with potatoes and wheat, the sandflies have almost entirely deserted the pah. They cannot stand the cold, and I never found any in shady places in cold winter days. I observed them as high as an altitude of 2,500 feet, but never higher.

Another unwelcome guest belonging to the same order is the mosquito (Culex); but it was fortunately of very local occurrence, and we travelled often for many miles without any sign of them. I know, in fact, only three spots where they occurred in any troublesome quantity. One was a deep gully of Mount Francis, near the Matakitaki plains, and the others were in gullies of the Maruia, but although we camped very often in quite similar places, we were never molested. It is true that the natives state that the mosquito is not indigenous to New Zealand, and that it has been introduced by the Europeans; but still it will be very difficult to explain how these diptera should be found in the country traversed by me only at a few isolated spots, and far inland, and then in such large masses.

The blue-bottle fly (Larcophaga lœmica) is another insect which occurs over the whole country, its presence being quickly made known by its intolerable noise. I met with it on the summits of the highest mountains which I ascended. It is suited for every degree of temperature, for I found some of them on the summit of Papahaua, flying over the snow before the sun had risen, and

the temperature several degrees below the freezing point, not at all affected by the chilling cold which had killed many other insects on the mountains in this unusually severe winter.

The weta (Deinacrida heteracantha), belonging to the order Orthoptera, is another inhabitant of the forests or manuka groves; it is a very ugly looking animal, and often of a large size. We found them often in and near our tents, coming from the wood which we burnt, or from the collected manuka bark used for bedding. Although my men, and especially the natives, were rather afraid of them, because it is said that a bite from their strong jaws instantly draws blood, I never saw them do it, notwithstanding they had sometimes selected disagreeable spots for their retirement, as, for instance, in empty shoes.

No large myriapode came within my observation, and the few ants which we met with occasionally were never troublesome. There are none which build nests, and it seems that they form only small colonies in hollow or rotten trees. I observed many flies and other small insects in the plains as well as in the mountain regions, and a wide field is open in New Zealand for the naturalist to study the innumerable inhabitants belonging to the lower classes of animal life, which enliven the vast wildernesses of these islands.

Having been always occupied with the principal object of my mission, I could only make observations occasionally in the extensive department of natural history, and I have therefore to ask indulgence, as I give only such scanty remarks under this head. I would not have departed from the special object of my mission even so far as I have done, did I not think it would perhaps induce some naturalist to come here and make fuller investigations, which would amply repay him for his time and trouble.

CHAPTER VI.

It would be presumption in me to offer any observations on the botany of this colony, seeing how admirably and fully the subject has been treated in the works of Dr. Hooker and others, but for the fact that the researches of the majority of these botanists have been restricted to the coast line, or to the interior of the Northern Island, and that the flora of the Alpine and sub-Alpine regions of this island was scarcely known to them. Within the last two years the flora of the interior of this province has been in some degree explored by Drs. Sinclair and Monro, and by Mr. W. T. L. Travers and Captain Rough, who have all collected highly interesting specimens; and I may here observe that it is a matter of regret that Dr. Sinclair, who has devoted much time to botanical researches in this colony, has not yet given to the world an outline of the geography of plants, which his intimate knowledge of the subject would enable him to do, and which could not fail to be very instructive.

It is a remarkable fact, and, so far as I remember, one which has never been noticed, that the majority of the flowers of the smaller plants in New Zealand, whether growing in open or in forest ground, in valley, plain, or mountain, are nearly colourless, and that, when otherwise, yellow and purple tints principally prevail, whilst those of the forest trees and their parasites are generally of a brilliant red. Amongst them the Metrosideros robusta (rata of the natives) and Metrosideros lucida are most abundant and conspicuous. The Metrosideros florida, too, adds much to the beauty of the forest, hanging in graceful festoons, covered with scarlet blossoms, from the tops of the highest trees. Although the New Zealand Fuschia cannot rival the ratas in beauty, it nevertheless gives a pleasing variety to the forest. It is a deciduous tree, the flowers of which appear before the leaves. Several species of Loranthus (misletoe) also adorn the woods, growing principally upon the evergreen Fagus, commonly known to the settlers as black and white birch. When in full bloom, these beautiful parasites greatly relieve the otherwise uniform and somewhat dull coloured vegetation of the New Zealand forest.

In this respect the Northern Island is still richer, for, in addition to those already named, we there find the puriri (Vitex littoralis) and the pohutukaua (Metrosideros tomentosa), the magnificent flowers of which form a great ornament to the landscape.

The plains near the banks of the Roto-iti lake, where I first began my examination, although of no great altitude, exhibit in their flora a sub-Alpine character. They are partly covered with grass, and, where stony, with mosses and lichens, amongst the latter of which several interesting genera of the tribe Lecidinæ, belonging principally to Stereocaulon and Cladonia, are most abundant. In other parts of the plains, speargrass (Aciphylla squarrosa), growing to a large size, predominates, so as to render travelling unpleasant, if not difficult; but in the plains it does not attain the same dimensions as on the summits of the mountains. Several species of Gentiana and Celmisia are also met with.

Near the lake I found a large and beautiful species of Arundo (toe-toe), which I believe to be new. On the banks of the rivulets the handsome little fern Lomaria alpina was abundant. The shrubs found in the plains and at the bases of the hills belonged principally to the genera Leptospermum, Veronica, and Eurybia, of which some few may yet be undescribed. I was at the lake during the flowering season of these plants, the latter part of January, and in some places the hill sides appeared as if covered with snow, the green leaves almost hidden below rich masses of white flowers.

The mountain sides near Lake Roto-iti, and of the interior generally, are covered with different species of Fagus, often becoming fine trees. They range to an altitude of 4,500 to 4,700 feet. For the last 300 feet they become dwarfish and covered with the lichen Usnea, of different forms, and generally of a light greenish or yellowish colour. I believe that 4,700 feet is the greatest altitude at which the Fagus is found, and that in this respect Mr. Bidwell has fallen into error in assigning to it a range of 7,000 feet.

The black-birch forest is generally open, and the ground as well as the stems of the trees are covered deeply with mosses of the genera Hypnum, Hookeria, Dicranum, &c., besides many Hepaticæ; also several handsome species of ferns of the genus Hymenophyllum occur. Amongst the ferns some species of Lomaria (for instance, Lomaria Volcanica) and some of the genera Asplenium and Polystichum range very high. Generally speaking, in the central part of the island, the birch forest is not immediately succeeded by a sub-Alpine vegetation, for I found that where the dwarfish and scrubby trees ended they were at once followed by snow-grass. Here, besides the Aciphylla squarrosa, often six to seven feet high, we meet with another spear-grass, the Aciphylla Monroi.

Amongst the rocks many interesting species of the genera

Celmisia, Ranunculus, and Gentiana are found, of which several have not yet been described. The surface of the ground too is often covered with a carpet of small flowering plants, Donatia and Raoulia, amongst which a new species of Raoulia occur, much larger than the grandiflora of Hooker. But the most interesting plant is another Raoulia, found on Mount Robert, at an altitude of 6,000 feet, forming semi-globular masses, often three to four feet in diameter, and covered with small yellow flowers. This plant was first discovered by Drs. Sinclair and Monro, on the summit of Mount Mowatt.

I have observed, in crossing various ranges of mountains in this province, that the vegetation is much affected by aspect. Forest, for example, which on the north-west side of a mountain maintains a full and luxuriant growth, in the eastern and south-eastern sides of the same mountain, without any alteration in the character of rocks, or of the surface soil, becomes stunted in growth, covered with mosses, lichens, and indeed exhibiting in every respect the characters of sub-Alpine growth. Of course this only becomes palpable when the elevation exceeds 2,500 to 3,000 feet; but I believe that careful observations would show, that although in the lower altitudes the growth may not be materially altered, as regards mere bulk, the value of the timber for economic purposes is affected by exposure to a south-eastern aspect. This, of course, is to be referred to the coldness of the winds from that quarter, which in general are also dry winds, while those from the north and north-west are warm and moist.

From the height of 1,200 feet upwards the Fagus is generally the principal forest tree; below this altitude it is intermixed with other trees, and then grows to a large size. I met with several specimens in the upper Grey, having a circumference of twenty feet. Amongst the trees with which it is commonly mixed in the lower ground are the matai (Podocarpus spicata), hinau (Eleocarpus hinau), totara (Podocarpus totara), kahikatea (Podocarpus dacrydioides), rimu (Dacrydium capressium), miro (Podocarpus ferruginea), and others. Amongst the smaller trees and bushes the Panax and Aralia are most ornamental, from the beauty of their large and glossy leaves. At an altitude of 400 to 500 feet, where the soil is good, the totara often predominates.

In the gullies I found abundance of fern trees, sometimes ranging as high as 2,000 feet; amongst them the Dicksonia lanata and Cyathea Smithii were the most numerous; but I also occasionally saw the Cyathea medularis (the mamaku of the natives), the stem and shoots of which they prepare as an article of food, although more frequent near the coast than in the interior.

The vegetation of the mountains near the Grey plains forms a striking contrast with that near the lakes. There, on Mounts Robert and Murchison, where the black birch becomes dwarfish

for several hundred feet, and is covered with mosses and lichens, and is then at once succeeded by an Alpine vegetation. In the mountains of the Grey, on the other hand, the birch forest maintains its growth in full vigour to a height of 3,000 feet, and is then at once succeeded by a sub-Alpine vegetation of a remarkable character and dense growth. Amongst it a Dracophyllum takes the first place; whilst Metrosideros lucida, Eurybia nitida, a Senecio, and a new species of Eurybia, nearly resembling Eurybia Cunninghamii, and a new species of Weinmannia, are very frequent. In sheltered places the Dracophyllum latifolium grows to the size of a small tree, its graceful form contrasting agreeably with the dwarf ramose plants around. At a height of 4,200 to 4,300 feet, these sub-alpine shrubs cease to grow, and are succeeded by different kinds of snow grasses, so called by the settlers because they indicate the line at which, during the winter, the snow remains longest. These grasses belong to the genera Danthonia, Deyenxia, &c., and are generally intermixed with flowers of the same order as observed on Mounts Robert and Murchison.

On Black-hill I found several umbelliferous plants, amongst which I discovered a new and beautiful species of Gingidium, to which my distinguished friend, Dr. Ferdinand Muller, of Melbourne, has given my name.

The plains on the western side of the central chain contain many open spots covered with grasses, amongst which several species of Lycopodium were growing. In the more stony places I found a Gaultheria, which appears to me to be quite distinct from any hitherto described. In the other boggy ground, formerly occupied by forest trees, of which the prostrated trunks are only half buried, a new vegetation has sprung up, consisting principally of stunted manuka (Leptospermum scoparium), Arundo Australis, the wiry, rigid Calorophus minus, and the stunted looking fern, Gleichenia dicarpa, which is largely distributed under the same circumstances over both islands. I also collected a very large Polytrichum, which I think will prove to be a new variety. Besides these plants and the common Pteris esculenta, I occasionally found other ferns, as, for instance, the Pteris scaberula, the Nephrodium decompositum, the Hypholepis millefolium, as well as several species of the genus Lomaria.

In the forest of the Grey plains the larger trees consist often exclusively of totara, kahikatea, and rimu, whilst the ground is covered with ferns not previously met with, amongst which I particularly noticed the beautiful Leptopteris superba, the Pteris vespertilionis, the Gleichenia Cunninghamii, and several species of the genera Lindsea and Adiantum.

On the coast a striking change occurs in the character of the vegetation. Here for the first time we found the nikau palm (Areca sapida), sometimes in such masses as to form perfect groves, and in others covering with its graceful form the summits of the

rocky cliffs. Here also I observed several species of Cordyline (ti tree), and the Freycinetia Banksii (the kiekie of the natives) abounded, the whole closely interlaced by the Ripogonum parvi florum, or supplejack, which sadly impeded our progress. In fact, the flora along the coast presented quite a new appearance, being more like that of the North Island. I also found several new forms of Filices and Lycopodiaceæ, amongst which were the beautiful Pteris comans, and other ferns generally found only in the northernmost part of this island, and several belonging to the genera Asplenium, Lomaria, Adiantum, &c. Amongst the Asplenia in particular were some new varieties of Asplenium bulbiferum.

In the swamps I did not observe any new plants except a species of Marchantia, which overspread with its coriaceous glossy leaves the more treacherous parts of the swamp, not covered with swamp mosses (Sphagnum), which was very abundant. The Phormium tenax (the New Zealand flax) is also to be found everywhere, ranging, as far as I could observe, to nearly 5,500 feet, and of which there are several varieties, principally growing on the mountains, and having totally different forms.

It would lead me too far were I to enter into greater details, especially as Dr. Ferdinand Muller, in Melbourne, to whom I have sent my collections, will describe what is new. I have no doubt that among the Musci, Hepaticæ, and lichens, of which I collected a considerable number, following the old Linnean maxim "mirare omnia etiam tristissima," and which are so important for the geography of plants. Several will be found to be undescribed, as well as the Fungi, of which I made coloured drawings of about fifty different specimens on the spot.

It was at one time my intention to have added to this report the meteorological tables kept by me during my journey, with comparative remarks upon the climate of the city of Nelson and that of the West Coast, but after having carefully looked over both tables, I find that generally speaking there is a great similarity between them in this respect. The tables therefore would be of little practical value, except as showing this result. It would, moreover, only add to the bulk of this already long report.

As I shall have, during further and extensive explorations in this island, about to be undertaken by me, ample opportunities of collecting data for comparison of its climatological differences and peculiarities, I shall in some future publication treat fully upon this important subject.

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